PRELIMINARY
INSTRUCTION BOOK
FOR

MODEL ST RADAR

NAVSHIPS 900,336-IB

CONFIDENTIAL
(Non-Registered)

MANUFACTURED BY WESTERN ELECTRIC COMPANY, INC.
NEW YORK, N. Y.
FOR
U. S. NAVY DEPARTMENT BUREAU OF SHIPS

Contract NXsr 61580 *Approved 23 AUGUST 1944*

ERRATA

Preliminary Instruction Book For
MODEL ST RADAR
NAVSHIPS 900,336-IB

(Insert this page following TABLE 1 in SECTION II.)

Change the note in SECTION II under SYSTEM ADJUSTMENTS, Paragraph 4. TUNING PROCEDURE—ST SYSTEM, to read as follows:

IMPORTANT—Production Models of the D-152271 Transmitter-Receiver Unit are designed to work in Model ST Radar and two other Radar Systems. Optional wiring, covered by notes, is provided to accomplish this flexibility. A careful check must be made of the Transmitter-Receiver Unit used in the ST Radar to make sure that it is wired for ST in accordance with the notes on Figures 22 and 25.

Correct drawing BR-17958, Figure 22, as follows:

Remove connection to GND from Term. 6 and connect GND to Term. 9. These terminals are on the Tube Chassis.

Correct drawing BO-13446, Figure 25, as follows:

Change value of resistor R( )14 in Keep-Alive lead from 3.3 MEG to 4.7 MEG. Ultimately two resistors, with optional wiring, will be provided, namely 3.3 MEG and 4.7 MEG. Use only the 4.7 MEG resistor for R( )14 in ST Systems.

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Contract NXsr 51560 *Approved 25 AUGUST 1944*

SECTION I

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NAVY DEPARTMENT
BUREAU OF SHIPS
WASHINGTON 25, D. C.

25 August, 1944

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/S/J. B. Dow,
By direction.

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RECORD OF CORRECTIONS MADE

CHANGE NO.	DATE	SIGNATURE OF OFFICER MAKING THE CORRECTION

GUARANTEE

The equipment including all parts and spare parts, except vacuum tubes, batteries, rubber and material normally consumed in operation, is guaranteed for a period of one year from the date of delivery of the equipment to and acceptance by the Government with the understanding that all such items found to be defective as to material, workmanship or manufacture will be repaired or replaced, f.o.b. any point within the continental limits of the United States designated by the Government, without delay and at no expense to the Government; provided that such guarantee will not obligate the Contractor to make repair or replacement of any such defective items unless the defect appears within the aforementioned period and the Contractor is notified thereof in writing within a reasonable time and the defect is not the result of normal expected shelf life deterioration.

To the extent the equipment, including all parts and spare parts, as defined above, is of the Contractor's design or is of a design selected by the Contractor, it is also guaranteed, subject to the foregoing conditions, against defects in design with the understanding that if ten per cent (10%) or more of any such said item, but not less than two of any such item, of the total quantity comprising such item furnished under the contract, are found to be defective as to design, such item will be conclusively presumed to be of defective design and subject to one hundred per cent (100%) correction or replacement by a suitably redesigned item.

All such defective items will be subject to ultimate return to the Contractor. In view of the fact that normal activities of the Naval Service may result in the use of equipment in such remote portions of the world or under such conditions as to preclude the return of the defective items for repair or replacement without jeopardizing the integrity of Naval communications, the exigencies of the Service, therefore, may necessitate expeditious repair of such items in order to prevent extended interruption of communications. In such cases the return of the defective items for examination by the Contractor prior to repair or replacement will not be mandatory. The report of a responsible authority, including details of the conditions surrounding the failure, will be acceptable as a basis for affecting expeditious adjustment under the provisions of this contractual guarantee.

The above one year period will not include any portion of time the equipment fails to perform satisfactorily due to any such defects, and any items repaired or replaced by the Contractor will be guaranteed anew under this provision.

REPORT OF FAILURE

Report of failure of any part of this equipment, during its service life, shall be made to the Bureau of Ships in accordance with current instructions. The report shall cover all details of the failure and give the date of installation of the equipment. For procedure in reporting failures see Chapter 67 of the "Bureau of Ships Manual," or superseding instructions.

INSTALLATION RECORD

Contract Number: NXsr 51560
Serial Number of equipment..
Date of acceptance by the Navy..
Date of delivery to contract destination....................................
Date of completion of installation..
Date placed in service..

Blank spaces above shall be filled in at time of installation. Operating personnel shall also mark the "date placed in service" on the date of acceptance plate located below the model nameplate on the equipment, using suitable methods and care to avoid damaging the equipment.

REPLACEMENT MATERIAL

All requests or requisitions for replacement material should include complete data covering the part desired, in the following form:

1. Name of part desired.
2. Federal Stock number (if assigned).
3. Navy Type number (if assigned) (including *prefix* and *suffix* as applicable).
4. Commercial designation.
5. Model designation (including *suffix*) of equipment in which used.
6. Navy Type designation (including *prefix* and *suffix* where applicable) of major unit in which part is used.
7. Contract, purchase order, requisition, etc., under which the equipment was procured.
8. Circuit symbol designation of part.
9. (a) Navy drawing and/or specification number (Include part or group number).
    (b) Manufacturer's drawing or specification's number. (Include part or group number.)
10. Rating or other descriptive data.

SAFETY WARNING

OPERATION OF THIS EQUIPMENT INVOLVES THE USE OF HIGH VOLTAGES (18000 VOLTS) WHICH ARE DANGEROUS TO LIFE. OPERATING PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE TUBES OR MAKE ADJUSTMENTS INSIDE EQUIPMENT WITH HIGH VOLTAGE SUPPLY ON. DO NOT DEPEND UPON DOOR SWITCHES OR INTERLOCKS FOR PROTECTION BUT ALWAYS SHUT DOWN MOTOR GENERATORS OR OTHER POWER EQUIPMENT. UNDER CERTAIN CONDITIONS, DANGEROUS POTENTIALS MAY EXIST IN CIRCUITS WITH POWER CONTROLS IN THE OFF POSITION DUE TO CHARGES RETAINED BY CAPACITORS, ETC. TO AVOID CASUALTIES ALWAYS DISCHARGE AND GROUND CIRCUITS PRIOR TO TOUCHING THEM.

Since the use of high voltages (18000 volts) which are dangerous to life is necessary to the successful operation of the equipment covered by these instructions, certain reasonable precautionary measures must be carefully observed by the Operating Personnel during the adjustment and operation of the equipment.

The high voltages employed on the panels of this equipment and on the wiring are not accessible during normal operation. All connections to the panels are made by means of pin-and-jack type connectors at the rear of the panels and are arranged so that all power is removed from the panel when the panel is withdrawn from its cabinet for maintenance or inspection purposes. With the panel withdrawn from its cabinet, and before touching any apparatus be sure to discharge it by momentarily grounding its exposed terminals as stated in the above warning. Connect the discharge lead to ground first, then the other end to the apparatus. Disconnect from the apparatus first, then from ground.

For testing some of the panels when withdrawn from the cabinets, power is applied to the panels by means of special connecting cords between the panel and the connector blocks in the cabinet. In such cases, the voltages at some terminals on the panels may be as high as 18000 volts and care should be exercised to avoid these voltages.

Great care must be exercised if it should become necessary to inspect any of the power cables, power wiring, power switches, or connectors in the cabinet. DO NOT SERVICE OR ADJUST ALONE WHEN INSPECTING HIGH VOLTAGE CIRCUITS.

THE ATTENTION OF OFFICERS AND OPERATING PERSONNEL IS DIRECTED TO CHAPTER 67 OF BUREAU OF SHIP'S MANUAL OR SUPERSEDING INSTRUCTIONS ON THE SUBJECT OF "RADIO—SAFETY PRECAUTIONS TO BE OBSERVED."

AN APPROVED POSTER ILLUSTRATING THE RULES FOR RESUSCITATION BY THE PRONE PRESSURE METHOD SHALL BE PROMINENTLY DISPLAYED IN EACH RADIO, RADAR OR SONAR ENCLOSURE. POSTERS MAY BE OBTAINED UPON REQUEST TO THE BUREAU OF MEDICINE AND SURGERY.

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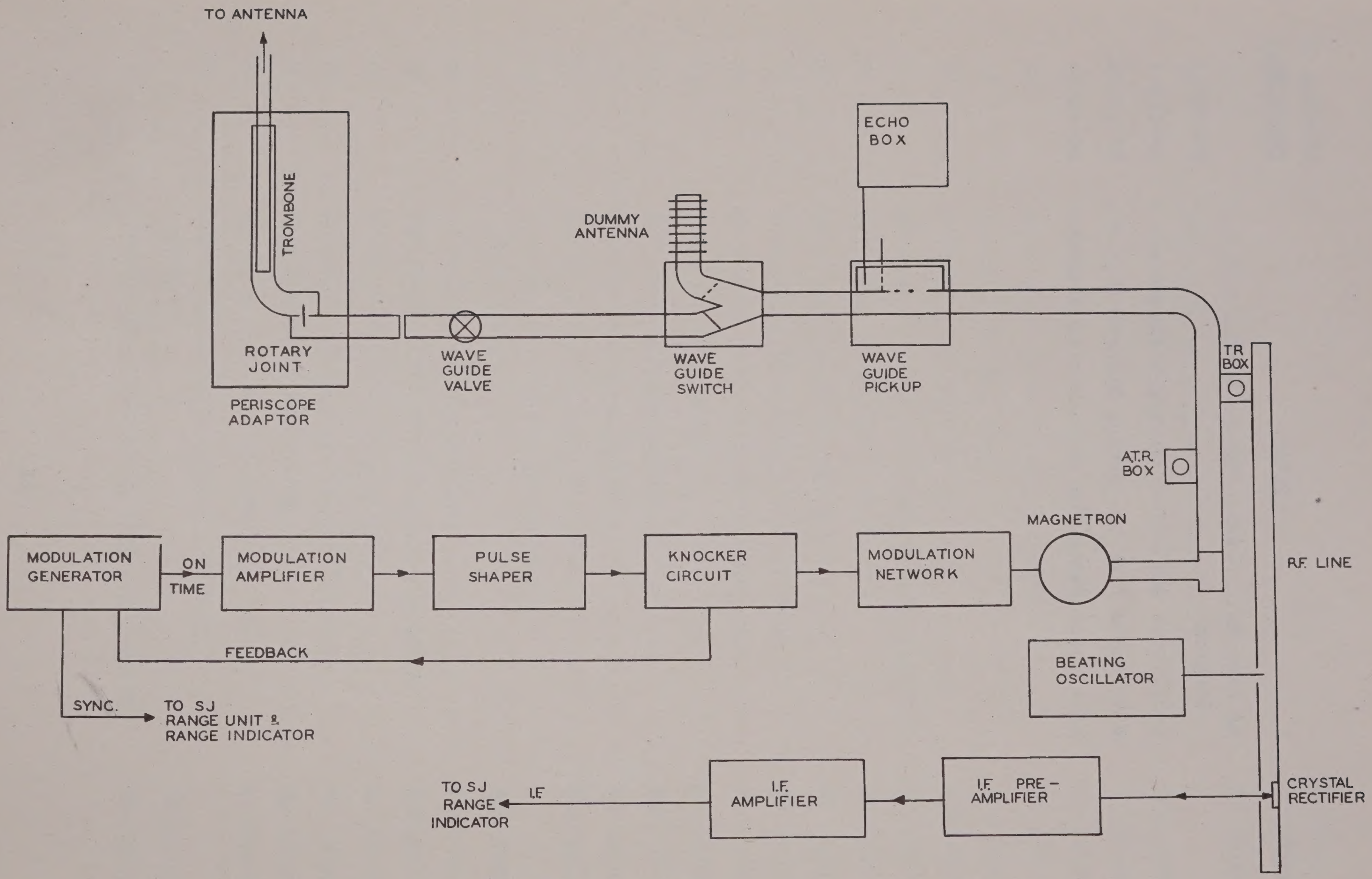

TO ANTENNA
TROMBONE
ROTARY JOINT
PERISCOPE ADAPTOR
WAVE GUIDE VALVE
DUMMY ANTENNA
WAVE GUIDE SWITCH
ECHO BOX
WAVE GUIDE PICKUP
TR BOX
A.T.R. BOX
R.F. LINE
MAGNETRON
MODULATION GENERATOR
ON TIME
MODULATION AMPLIFIER
PULSE SHAPER
KNOCKER CIRCUIT
MODULATION NETWORK
FEEDBACK
SYNC.
TO SJ RANGE UNIT & RANGE INDICATOR
BEATING OSCILLATOR
CRYSTAL RECTIFIER
I.F. PRE-AMPLIFIER
I.F. AMPLIFIER
I.F.
TO SJ RANGE INDICATOR

Figure 1—Model ST Radar—Functional Diagram—ESC–990866

SECTION I—GENERAL DESCRIPTION

1. GENERAL

The Model ST Radar, used in conjunction with Models SJ (or SS) Radars on submarines is a radio detection and ranging equipment for detecting ships, submarines awash or submerged to battle periscope exposure, and land marks. A functional diagram is shown in Figure 1.

The method employed consists of transmitting short pulses of ultra-high-frequency energy and receiving and timing the reflected signals. The time delay, as indicated on the cathode-ray oscilloscope in the SJ (or SS) Radar, gives a measure of the distance to the object causing the reflection.

The pulse rate is adjustable between 1500 cps for use with Model SJ Radar and 600 cps for use with Model SS Radar. The transmitted energy is in the "X"-frequency band and is generated by a magnetron located in the Transmitter-Receiver Unit. The transmission line between the Transmitter-Receiver Unit located in the control room and the Antenna located in the periscope is made up of rectangular wave guide. A Periscope Adapter, containing a rotary connection and a telescoping section of wave guide, makes it possible to rotate the periscope and raise and lower it through 30 inches while the Model ST Radar is in operation.

A Wave Guide Pick-up Unit is provided in the transmission line for supplying transmitted energy to an echo box and returning echo pulses to the receiving equipment. This is used during the initial tune-up of the system and also as a check of system operation when the submarine is submerged or when targets are not available. A Wave Guide Switching Unit is also provided in the transmission line so that, with all power off the ST Antenna is closed off from the Transmitter-Receiver Unit, thus providing protection for the crystal from near-by Radars. With the switch in this position, the ST Radar may be operated into the Dummy Antenna while the submarine is submerged or when it is desired to maintain radar silence with the ST Radar in an operating condition.

A Selector Unit provides a switching arrangement of power so that either the SJ (or SS) Radar may be operated normally or the ST Radar may be operated using the ranging equipment in the SJ (or SS)

Radar. This switching is controlled by the Selector Control Unit which gives pilot lamp indication in the conning tower of the operation of the two systems.

The Selector Unit also contains the modulator generator circuit for the ST Radar and a two-stage amplifier for the intermediate-frequency outputs of both the SJ (or SS) and the ST receivers before transmitting them to the Range Indicator Unit for final amplification and detection.

2. UNIT, DIMENSIONS, AND WEIGHTS

The unit numbers, over-all dimensions and approximate weights of the major units of the Model ST Radar are shown in Table 1.

The major units, together with required cabling, are shown in Figure 11.

3. VACUUM TUBE COMPLEMENT

The vacuum tube complement for Model ST Radar is given in Table 2.

4. SYSTEM PERFORMANCE

a. Frequency: X band.

b. Pulse rate: 1500 per second ±10 per cent when used with SJ Radar, and 600 per second ±10 per cent when used with SS Radar.

c. Pulse width: approximately 0.3 microsecond at peak current value.

d. Beam width: 30 degrees at half power.

e. Beam height: 9 degrees at half power.

f. Main sweep length: 60,000 yards.

g. Expanded sweep length: 20,000 yards.

h. Precision sweep length: 2,000 yards.

i. Useful range of equipment: varies with size of target, height of antenna and atmospheric conditions.

j. Peak power output: approximately 30 kilowatts.

k. Power supply: equipment operates from 115 volts, 60 cps, obtained from Main Control Unit in associated SJ (or SS) Radar.

l. Maximum input power: 1.4 kilowatts.

TABLE 1—D-152220—MODEL ST RADAR: UNIT DATA

Quan.	Unit Number	Description	Designation Navy	Designation Mfgr.	Over-all Dimensions H	Over-all Dimensions W	Over-all Dimensions D	Approx. Weight
1	2	Selector Unit	24AAH	D-152272	14-3/4	16-9/16	16-13/16	95
1	3	Transmitter-Receiver	43ACU	D-152271	19-1/2	15-11/16	13	150
1	4	Selector Control Unit	23AFP	D-152274	4-5/8	7-7/8	3-1/2	15
1	5	Periscope Adapter	14ABB	D-152273	48	14-3/4 Diameter		220
1	7	Wave Guide Switching Unit	24AAF	D-152277	3-7/8	10	11-1/8	20
1	8	Echo Box	14AAX	D-152349	15	18-7/8	16-1/4	40
1	10	Wave Guide Pick-up	14ABC	D-152280	3-7/8	8-1/8	11-1/8	16
1	11	Junction Box	62ABK	D-152381	17-9/16	13-1/4	4-7/8	40
1	12	Dummy Antenna	66AHT	X-66325-A	1-3/4	7-13/16	2	8
1	13	Transmitter Mtg. Frame	10376	D-152372	27-15/16	19-1/8	13-19/32	80

TABLE 2—VACUUM TUBE COMPLEMENT: MODEL ST RADAR

	Number of Tubes of Type Indicated 2J50	705A	723A/B	724B	5D21	6H6	6V6-GT	6SN7GT	6AK5	Total
Transmitter-Receiver	1	1		2	1	1	1	1		8
Oscillator Amplifier			1						3	4
Selector Unit							3	4	2	9
Totals	1	1	1	2	1	1	4	5	5	21

SECTION II

INSTALLATION AND ADJUSTMENTS

SECTION III

OPERATION

SECTION II—INSTALLATION AND ADJUSTMENTS

1. LOCATION OF ST RADAR UNITS

The Transmitter-Receiver, Wave Guide Pick-up, Echo Box, Wave Guide Switching Unit and Dummy Antenna shall be installed in the control room in a location and manner that will provide the shortest possible length of wave guide with a minimum number of bends between the Transmitter-Receiver and the wave guide valve on the periscope well.

The Selector Unit and Selector Control Unit shall be mounted in suitable space in the conning tower. The Selector Control Unit should be within easy reach of the operator at the Range Indicator in the SJ (or SS) Radar.

The equipment shall be interconnected in accordance with information shown in Figure 12.

2. PREPARATION OF SJ, SJ-a or SJ-1 SYSTEM FOR ST INSTALLATION

IMPORTANT NOTE: The following field changes must have been made in the SJ Radar before the ST Radar can be installed. Materials for these changes, together with the instructions are supplied with each Model ST Radar Equipment.

FC #	Purpose	Reason Required
SJ 35, SJ-1 25	Increased Overload	Space of removed R39 required for ST
SJ, SJ-1 37	Sweep Centering	Spare main terminals required for ST
SJ, SJ-1 31	6Y6G Tubes in Reg. Rect.	To supply increased load of ST

a. General

The interconnecting cables of the system must be changed to provide the switched selection between SJ and ST Transmitters. The new interconnections are shown in Figure 12. Internal changes are required only in the SJ Range Indicator. The D-152383 Modification Parts include material for these changes and the following instructions cover the steps necessary for the installation of these parts. The new circuits are shown in the Range Indicator schematic, Figure 13.

b. New IF Gain Control Circuit

The 60-mc output of both transmitter-receivers are connected, through matching impedances, to the input of a two-stage amplifier mounted in the ST Selector Unit. Gain is controlled by varying the bias on these two stages for both SJ and ST Radars. This arrangement provides appreciably better performance at very short range. A simplified schematic is shown in Figure 14.

Install the Modification Parts in the Range Indicator in the following manner:

(1) Mount the new resistor strip, carrying resistors R40A and B, and R110, 111, 112 on the underside of the horizontal chassis as shown in Figure 15A.

(2) With a No. 26 drill, make a hole approximately as shown in Figure 15A near the IF GAIN potentiometer to mount a ground lug (provided).

(3) Wire as shown in Figure 15A. Rather than make excessive runs of loose wires, one splice is required as indicated. The wires can be made accessible by removing the bezel from the indicator and pulling the wires out the front. The wh-or and wh-rd-gn wires shown are those previously connected to the IF GAIN potentiometer. The splice should be well soldered, taped and coated with glyptal or suitable substitute.

(4) All loose wires should be secured to existing cables or frame parts with cable lacing twine.

c. ST TR Box Keep-alive

The ST Transmitter does not have a built-in source of keep-alive voltage, as does the SJ Transmitter. Since all plate voltages are off the SJ Transmitter with ST in operation, the voltage must be taken from the CRO supply of the Range Indicator.

Figure 15B, shows the required changes, material for which is supplied.

(1) Drill panel for cable and cable packing box.

(2) Mount terminal strip bracket. In most instances, the holes will already be in the frame of the power supply unit.

(3) Wire. The one internal wire is shown in Figure 15B. Use high-voltage wire supplied.

d. New REC TUNING Circuit

To make the REC TUNING control effective for both SJ and ST repellers with minimum interdependence the circuit shown in Figure 16 is used. Separate line-up controls are provided so that the REC TUNING control on the Range Indicator becomes a fine trimming control for both systems. Some early SJ Range Indicators were provided with a 0.1 Meg. uning potentiometer with R65, 33,000 ohms, in series. In these cases, the 0.2 Meg. potentiometer supplied should be installed and the old R65 removed.

(1) Mount the new R65, 0.22 Meg., on the front side of terminals 10 and 12 of the connecting block in the CRO power supply unit.

(2) Install the wiring shown in Figure 15C. In some cases field change No. 37 (Improved Sweep Centering) may have been made without removing the main terminal wires released thereby. In such case, it will be necessary to trace out the wires previously associated with main terminals 24, 25, 26 and 27 and remove them. As noted earlier, Field Change No. 37 must have been made before the ST installation can be made.

e. New Unit Nameplate

Replace nameplate on Range Indicator with one supplied.

f. Record Conversion

(1) Use the new record card only in case there is none already secured in the indicator. Enter on the card: "Modified for SJ/ST. No longer suited for SJ only or Mark 27." This modification does not carry a field change number.

(2) Enter "Modified for SJ/ST" on completion report cards and deposit in a Navy post office. Avoid use of classified information such as the word "Radar".

3. INSTALLATION OF PERISCOPE ADAPTER

The following is a suggested method of installing the D-152273 Periscope Adapter.

> IMPORTANT: Two bolt-ring flanges or liners are required for mounting the wave guide valve and eccentric stop on the periscope well. These two liners must be mounted parallel to each other and on a center line which passes through the axis of the periscope, regardless of the position of the periscope in the well.

a. Installation of Adapter on Periscope

Align the gasketed wave-guide choke on the Adapter with the wave guide choke on the bottom of the periscope and bolt the Adapter to the periscope using the bolts, nuts, and lockwashers provided with the Adapter. The Adapter shall be true with the axis of rotation of the periscope within 1/64 inch. It may be desirable, after the necessary alignment has been accomplished, to dowel the Adapter flange to the periscope flange; no dowels are provided, however.

b. Location of Wave Guide Valve

Select a position on the outside of the periscope well for the wave guide valve. The centerline of the valve shall be in the control room not more than 78 inches below the maximum possible height of the bottom of the periscope; it shall be located at least 45 degrees away from the line of travel of the hoist cables; the gasket surface of the flange shall be between 8-3/4 inches and 10-1/2 inches out from the axis of the periscope. (If the well is too large in diameter, it must be cut back to admit the valve with sufficient space to operate the valve wrench through a 90-degree arc of eight-inch radius from the valve core, the limits of which are a point along the wave guide axis away from the well, and a point either directly above or directly below the valve core.)

c. Installation of Liner for Wave Guide Valve

Weld a flat circular liner to the outside of the well at a place which will fulfill the conditions of b. The liner shall be 6-1/2 inches in outside diameter with a 4-inch diameter hole extending through the well wall, and shall contain seven equally spaced 5/8-11 tapped holes (3/4 inch deep) on a 5-3/16-inch diameter bolt circle. For the pre-production models (CXGK) the tapped holes shall be located so that one hole is on the vertical centerline either directly above or directly below the center of the flange; if directly above, the alignment marks on the valve core can be read from the left side; if directly below, they can be read from the right. For production (ST) one hole shall be on the horizontal centerline, on the side from which it is desired to see the alignment marks.

d. Installation of Liner for Eccentric Stop

Weld a second liner to the outside of the well for the eccentric stop. This liner shall be installed opposite the valve liner within 1/8-inch vertically and 1/4-inch horizontally of a center line which passes through the axis of the periscope. The stop liner shall be 5-3/8 inches in outside diameter with a 2-3/4 inch hole extending through the well wall, and shall contain five equally spaced 5/8-11 tapped holes (3/4 inch deep) on a 4-1/16-inch diameter bolt circle. The orientation of the tapped holes is unimportant. The gasket face shall be 8-3/4 inches minimum and 10-1/2 inches maximum from the axis of the periscope.

e. Preparation of Valve Extension

Fit the valve to the Adapter in the following manner: Operate the periscope to such a position that the mica-covered wave guide choke at the bottom of the Adapter is squarely facing the hole in the liner. Measure the distance from the liner flange to the cap on the Adapter wave guide choke; subtract 1/32 inch from this distance, and mill off the 2-1/2-inch diameter projection (BL-18411) on the valve to the corrected dimension. Cut the unfinished end of the wave guide assembly supplied with the valve to a length such that the cap will be slightly under flush (1/32 inch) with respect to the end of the projections and solder the loose wave guide cover plate in place. In soldering, the neoprene gasket on the wave guide assembly shall be removed or suitably protected from excess heat.

f. Installation of Valve

Assemble the valve and bolt to the liner through a 1/16-inch (uncompressed thickness) gasket, using the cap screws and lockwashers supplied with the valve. (Gaskets are not supplied.)

g. Installation of Eccentric Stop

Bolt the eccentric stop assembly to its liner through a 1/16-inch (uncompressed thickness) gasket, using the cap screws and lockwashers provided with it. (Gaskets are not supplied.)

h. Adjustment of Stop

Adjust the stop by loosening the 2-1/4-inch jam nut and turning the threaded rod until the Adapter hits the valve and stop simultaneously. If possible the stop shall be adjusted so that an upward blow on the eccentric end will tend to tighten the jam nut on the flange. After adjustment the jam nut shall be thoroughly tightened.

After completion of the installation the distance between the wave guide mica-faced choke flanges should be checked for proper clearance. This gap should be 3/32 ±1/32 inch (metal cap to metal cap). If these limits are exceeded, excessive standing waves may be set up in the RF system, which may impair or prevent operation of the system. There is no adjustment provided for changing this gap. In case the limits are exceeded it will be necessary to machine the face of the wave guide valve or increase the gasket thickness. The periscope shall then be extended and rotated several times to ascertain that the Adapter will operate smoothly.

4. TUNING PROCEDURE—ST SYSTEM

IMPORTANT: Production Models of the D-152271 Transmitter-Receiver Unit are designed to work in Model ST Radar or two other Radar Systems. "X" and "Y" wiring is provided to accomplish this flexibility. A careful check must be made of the Transmitter-Receiver Unit to make sure that only "X" wiring is used for Model ST Radar. See Figures 22 and 25.

In tuning and aligning the Transmitter-Receiver of the ST Radar it is necessary to perform the following functions in the order listed:

1. Adjust ON TIME potentiometer for proper HV current.

2. Adjust the beating oscillator to 60 megacycles above or below the transmitter frequency.

3. Adjust the repeller voltage for maximum output of the beating oscillator at the above selected frequency.

4. Tune the RF line tuning stubs for maximum crystal current and adjust crystal current to 0.7 ma ±0.2 ma:

5. Tune the TR box for maximum response on echoes from echo box or distant targets.

6. Tune the ATR box for maximum response on echoes from echo box or distant targets.

NOTE: In the following tuning procedure, no items of test equipment other than the units furnished with the ST system are necessary. However, due to the location of the Transmitter-Receiver in the control room and the Indicator in the conning tower it will be necessary to have an observer watch the indicator and relay the information to the man making the adjustments.

a. Adjustment of ON TIME

The ON TIME potentiometer in the modulation generator shall be adjusted to give a current reading on the HV MILLIAMMETER of 160 milliamperes when the HV VOLTMETER reads 1.2 kilovolts. These are the proper operating conditions and should not be changed from the above values.

b. Adjustment of Beating Oscillator

The beating oscillator frequency is adjusted by turning the screw actuating mechanism attached to the bow strips on the 723 A/B tube, using the special insulated tool provided for that purpose.

> CAUTION: The shell of this tube is approximately 300 volts above ground. Be careful not to come in contact with this tube if the door of the oscillator amplifier is removed during operation.

Turning the screw clockwise decreases the frequency of oscillation and vice versa. If this tube is being replaced start with this knob turned full clockwise (bow strips at maximum separation). The frequency will then be close to the desired region. With the RECEIVER TUNING potentiometer, P9, on the Range Indicator set at approximately the center of its range and the "ST REPELLER VOLTAGE" potentiometer on the Selector Unit turned in a full clockwise direction, slowly turn the REPELLER ADJUST potentiometer R-11 on the Oscillator Amplifier (screwdriver adjustment) in a clockwise direction, watching the crystal current meter on the face of the Transmitter-Receiver. The desired mode of operation for these tubes is the third mode, which occurs in the region of repeller voltage between 130 and 155 volts.

After the correct mode has been determined for the beating oscillator, slowly turn the RECEIVER TUNING potentiometer, P9, through its entire range meanwhile watching the indicator for echoes. It should be noted that if the echo box is used for tuning the system, an echo time of several hundred yards may be obtained without the beating oscillator operating. This should not be mistaken for proper operation of the detection circuit. Such false echoes may be identified by inability to maximize with movement of the RECEIVER TUNING control. If no real echoes are indicated, slowly turn the cavity adjustment of the 723 A/B tube in a counterclockwise direction, watching the scope and also the crystal current meter to see that the beating oscillator does not drop out of oscillation or the crystal current become excessive.

Alternate this operation with maximizing the output of the beating oscillator by slightly readjusting potentiometer R-11 for maximum crystal current, until true echoes are obtained. This indicates that the beating oscillator is then operating at 60 mc ±0.5 mc above or below the transmitter frequency. Either frequency is acceptable.

During the above operation it may be necessary to adjust the crystal current as outlined in Paragraph d below. This will be necessary if the current is below 0.1 milliampere or near 1.0 milliampere. Do not let the crystal current exceed this value or the crystal may be damaged.

c. Maximizing Output of Beat Oscillator

After echoes have been received, carefully adjust the cavity tuning and repeller voltage (potentiometer R-11) until the echoes are maximum when the crystal current is maximum. This is the desired point of operation.

NOTE: The frequency of the 723 A/B beating oscillator tube will drift somewhat during the warm-up period. The final tuning adjustment should therefore be done only after the set has been on for a sufficient period of time to reach stable operating temperature. This time may vary anywhere from 15 minutes to one hour depending on local conditions.

d. Tuning Detector Circuit

The crystal detector circuit is tuned by adjusting the two screwdriver tuning plugs, located in the wave guide section immediately below the 723 A/B tube, until a maximum crystal current is obtained. It is necessary to remove the cover of the Oscillator Amplifier to make this adjustment. During this operation it may be necessary to decrease the amount of crystal current. It should be remembered that the sensitivity of the crystal can be substantially reduced by allowing the crystal current to become excessive. It is well to keep the crystal current below 1.0 milliampere at all times. The amount of crystal current is controlled by the distance the beating oscillator probe is inserted into the wave guide. This adjustment is made by first loosening the three locking screws which secure the beating oscillator tube holder in place, and then turning the positioning screw adjacent to the tube, using the same tool provided for tuning the beating oscillator. This adjustment can be made from the front without removing the cover of the Oscillator Amplifier. Turning the screw clockwise increases the crystal current and vice versa. The final crystal current after all other adjustments and alignments have been made should be set to 0.7 ma ±0.2 ma.

e. Tuning the TR Box

The TR Box should be tuned for maximum response on a distant echo or maximum echo time from the echo box. The tuning is accomplished by adjusting the position of the two tuning plugs in the cavity. These plugs are screwed into or out of the cavity by means of the ratchet-actuating lever arms attached to them. Operate the lever arm back and forth at the same time watching the indicator. If the echoes decrease, reverse the ratchet and continue in the opposite direction. Continue to operate the lever arm, until the echo has been maximized. It is well to keep the two tuning plugs inserted to approximately the same distance into the cavity but the final adjustment should be made on one plug only. If a distant echo is used for tuning be sure the gain of the receiver is set so that it does not bring the echo into the overload region of the receiver or the effect of the tuning will not be apparent.

f. Tuning the ATR Box

The ATR Box is tuned by the same general procedure as employed on the TR Box described in Paragraph e. However, the ATR Box tuning on echoes is very broad and has little noticeable effect over much of the tuning range. There are sharply defined dips in the tuning range where the echoes will disappear entirely. It is well to set the ATR Box tuning half way between two dips or if only one dip is apparent, it should be set well away from that position.

TABLE 1—LIST OF CONTROLS BY UNITS

Control	Type of Control		Location	Function
ST-SJ	Toggle Switch	S1	Front Panel	Switches power between ST and SJ Trans-Rec.
ST ECHO BOX ON	Toggle Switch	S2	Front Panel	Connects Echo Box through Wave Guide Pick-up.
ST ANTENNA ON	Toggle Switch	S3	Front Panel	Connects ST Antenna through Wave Guide Switch.
ST REP RATE	Knob	R1	Front Panel	Adjusts base oscillator frequency.
Selector Unit				
COARSE PULSE RATE	Screwdriver	R27	Mod.Gen.Chassis	Adjusts base oscillator frequency.
ON TIME	Screwdriver	R22	Mod.Gen.Chassis	Adjusts high voltage current.
PRE-KNOCK	Screwdriver	R7	Mod.Gen.Chassis	Adjusts pre-knock multivibrator.
IF GAIN EQUALIZER ST	Screwdriver	R53	Mod.Gen.Chassis	Adjusts gain of IF Pre-amplifier on ST.
ADJUST REPELLER VOLTAGE ST	Screwdriver	R46A&B	Front Panel	Adjusts ST repeller voltage.
ADJUST REPELLER VOLTAGE SJ	Screwdriver	R47A&B	Front Panel	Adjusts SJ repeller voltage.
SERVICE SWITCH	Toggle Switch	S3	Inside Top	Restores power with door switch open.
Transmitter-Receiver Unit				
Tuners (RF Line-two)	Screwdriver		RF Line Below 723 A/B	Tunes RF Line for maximum crystal current.
TR Box Plugs (two)	Ratchet		TR Box	Tune TR cavity.
ATR Box Plugs (two)	Ratchet		ATR Box	Tune ATR cavity.
REPELLER ADJUST	Screwdriver	R11	Osc. Amp.	Adjusts repeller voltage.
B.O. Tune	Socket Wrench		Osc. Amp.	Tunes beating oscillator.
B.O. Injection	Socket Wrench		Osc. Amp.	Controls crystal current.
SERVICE SWITCH	Toggle Switch	S3	Inside Top	Restores power with door switch open.

SECTION III—OPERATION

1. OPERATION

a. To Turn Equipment on After Complete Shut-Down

(1) At the SJ Main Control Unit.

(a) Operate the HEATER UNITS switch to ON.

(b) Operate the MAIN switch to ON.

(c) Operate the H.V. RECTIFIER switch to ON.

(d) Adjust the LOAD control until the a-c voltage meter reads 120 volts.

(e) After the time delay relay has operated adjust the H.V. RECTIFIER control until the plate supply voltage meter reads 1.2 kv.

(f) The H.V. MILLIAMMETER should read 160 milliamperes with the ST Radar in operation. If it does not, adjust ON TIME potentiometer, R22, in the modulation generator until the above current value is obtained with the high voltage at 1.2 kv.

(2) At the Selector Control Unit.

(a) Operate the ST - SJ switch to ST.

(b) Operate the ECHO BOX switch to ON.

(c) Operate the ST ANTENNA switch to OFF.

(3) At the Regulated Rectifiers.

(a) Adjust the screwdriver control labeled VOLTAGE ADJUSTMENT until the meter reads 300 volts.

(4) At the SJ Range Indicator.

(a) Allow the equipment a 15-minute warm-up period.

(b) Adjust the SWEEP control to MAIN.

(c) Adjust the FOCUS and the INTENSITY controls until a clear sharp trace appears on the screen.

(d) Adjust the IF GAIN and the REC TURNING controls to obtain maximum height of echoes.

(5) At the Selector Control Unit.

(a) With the periscope extended and the Periscope Adapter in operating position, operate the ST ANTENNA switch to ON and the ECHO BOX switch to OFF.

The above procedure will put the ST Radar in operation and will have the SJ Radar in a stand-by position.

b. To Put the SJ Radar in Operation from the Above Condition

(1) At the Selector Control Unit.

(a) Operate the ST SJ switch to SJ.

This puts the SJ Radar in operation and puts the ST Radar in a stand-by position.

c. To Put Both Systems in Stand-By Position

(1) At the SJ Main Control Unit.

(a) Operate the HV Rectifier switch to OFF.

d. To Completely Shut Down Both Systems

(1) At the SJ Main Control Unit.

(a) Operate the HV RECTIFIER switch to OFF.
(b) Operate the MAIN switch to OFF.
(c) Operate the HEATER UNITS switch to OFF.

SECTION IV

THEORY OF OPERATION

SECTION IV—THEORY OF OPERATION

1. SELECTOR UNIT 24AAH

The Selector Unit shown in Figures 3 and 4, contains a relay controlled switching arrangement for transferring the power circuits between the Transmitter-Receiver Units of the ST Radar and the SJ (or SS) Radar. The unit also contains the modulation generator for the ST Radar and a two-stage IF Amplifier for both the ST and SJ (or SS) Radar. A schematic diagram of this unit is shown in Figure 18.

a. Selector Switch

The selector switch is a four-deck rotary switch with four sets of contacts on each deck. This switch transfers the +300 V; +450 V, +1200 V power supplies, the crystal motor circuit, the door switch circuit, the repeller bias, the sync. pulse and the receiver tuning circuits between the two transmitters depending on which system is in operation. It also removes the +120V plate supply from the ST oscillator amplifier when the SJ Radar is in operation.

b. Modulation Generator

The modulation generator is used to generate the synchronizing pulse and the "On Time" wave for operating the ST Radar. A functional diagram is shown in Figure 17.

Tube V1 is a self-oscillatory multivibrator or base oscillator which determines the repetition rate of the system. Two repetition rates are provided, centering at 600 cps for operation with SS Radar and at 1500 cps for operation with SJ Radar. A variation of plus or minus 10 per cent in the pulse repetition frequency is provided by the variable grid resistor R1 in the Selector Control Unit. The initial mean setting of the pulse repetition rate is determined by the variable grid resistor R27.

The output of multivibrator V1 is differentiated and applied as the starting pulse to the grid of V2 which is the "On Time" multivibrator. The time plot of the modulation generator is shown in Figure 19. The period of this multivibrator is controlled by the variable grid resistor R22 and the feedback from V4 in the Transmitter. See Section IV Paragraph 3 b (2). Its output is applied to the pre-knock multivibrator V5 which is triggered by the descending portion of the On Time wave and caused to generate another wave or SYNC pulse starting at the end of the On Time wave. The On Time wave and the pre-knock wave are fed into the mixer tube V3 and are thus added to form a wave equal in duration to the sum of the two. This is taken off at the cathode of V4 and supplied to the Transmitter to control the conducting time of V4 which fires the Transmitter.

The output of the pre-knock multivibrator V5 is also supplied to the cathode follower V6 to form the SYNC output for triggering the Range Unit and the sweep circuits in the Range Indicator.

The time duration of the On Time multivibrator is approximately 185 microseconds. It will be noted on the time plot, Figure 19, that the pre-knock multivibrator starts at the end of the On Time multivibrator positive wave. The positive wave output of the pre-knock multivibrator is variable from 3 to 8 microseconds and is added on the On Time positive output of V2 to form the wave which controls the conducting time of V4 in the Transmitter-Receiver. Thus the sweep circuits will be started 3 to 8 microseconds before the end of the conducting time of V4 in the Transmitter-Receiver.

c. D-152382 IF Amplifier

The IF Amplifier located in the Selector Unit is a two-stage, grid controlled amplifier through which the IF outputs of both systems are amplified before transmission to the IF amplifier in the Range Indicator. The schematic diagram is shown in Figure 20.

The IF output from the SJ Radar is fed to the amplifier at jack J2 and is terminated by resistors R9, R4 and R10 which form a series parallel termination of about 70 ohms. The IF output from the ST Radar is fed to the amplifier at jack J1 and is terminated by resistors R4, R9 and R10 which form a series parallel termination of about 50 ohms. The output from the IF preamplifier in the ST Radar is controlled by potentiometer R53 before reaching this amplifier so as to equalize it with the IF output from the SJ Radar. The SJ and ST outputs at jack J3 have a maximum gain of about 20 db through this amplifier.

The grid circuits of V1 and V2 are tuned to 60 megacycles by capacitors C17 and C18 respectively. The output circuit is tuned by capacitor C19 and the output impedance is matched to the coaxial output by inductor L3. The plate circuits are fed in parallel from +120 volts obtained from the cathode of voltage regulator tube V7 on the modulation generator chassis.

The cathodes of tubes V1 and V2 are returned to ground through a variable voltage divider in the Range Indicator Unit of the SJ Radar. This provides control of the IF gain of both Radars at the Range Indicator Unit.

2. SELECTOR CONTROL UNIT 23AFP

The Selector Control Unit shown in Figure 5, provides a convenient means of switching between the ST Radar and the SJ (or SS) Radar. It also provides for controlling the operation of the Echo Box and the ST Antenna. Three pilot lamps are provided to indicate whether ST or SJ Radars are in operation and if the ST Antenna is in use. The schematic diagram is shown in Figure 21.

Variable resistor R1 in this unit is in the grid circuit of the base oscillator multivibrator in the modulation generator circuit and is an adjustment of the pulse rate frequency.

3. TRANSMITTER-RECEIVER 43ACU

a. General

The Radar Transmitter-Receiver Unit, shown in Figures 6 and 7, contains all of the transmitting circuits for the Model ST Radar except the modulation generator and all of the receiving circuits except the IF amplifier. The schematic diagram is shown in Figure 22.

The transmitter operates at a pulse rate determined by the base oscillator multivibrator located in the modulation generator and generates UHF pulses of about 0.3 microsecond duration. The Receiver portion of this unit, shown in Figures 8 and 9, contains an RF line and an oscillator-amplifier, the purpose of which is to detect, or demodulate, received signals down to 60 megacycles, and then amplify the intermediate frequency as formed before delivering it to the two-stage grid gain controlled IF amplifier located in the Selector Unit. The Transmitter-Receiver performs the following distinct functions:

(1) Amplifies the On Time wave from the modulation generator in the modulation amplifier.

(2) Generates high voltage pulses in a modulation network for triggering the magnetron.

(3) Generates ultra-high-frequency oscillations in the magnetron.

(4) Protects the receiving equipment from the high power present during transmission by means of a TR box.

(5) Generates in the Oscillator-Amplifier a beating oscillator frequency which is 60 megacycles above or below the magnetron frequency.

(6) Mixes the received signal pulses with the beating oscillator frequency in a crystal converter and produces a pulse modulated 60-mecacycle intermediate frequency.

(7) Provides preamplification in the Oscillator Amplifier for the IF before it is transmitted to the IF amplifier, in the Selector Unit.

b. Transmitter

(1) Modulation Amplifier

The Transmitter is keyed or pulsed by the On Time negative output from the modulation generator which is applied to the grid of the double triode V1. This tube serves as a two-stage voltage amplifier and is capacitance-coupled to V2, a power amplifier. The output of V2 is essentially a square wave with a voltage swing of about 250 volts. The leading edge of each positive swing, however, is modified by a shunt circuit consisting of capacitor C3, resistor R18 and twin diode V3. It is the function of this shunt circuit to prevent the leading edge from rising so sharply as to cause premature oscillations in the magnetron. When the plate of V2 swings positive, diode V3 conducts and capacitor C3 charges rapidly. The rise in grid voltage at pulser tube V4 is delayed until capacitor C3 is charged. The trailing or negative edge of the wave is not delayed as diode V3 will not conduct when the plate of V2 swings negative.

Jack J3, connected between resistors R8 and R12, is a test point that can be used to obtain a synchronized pulse for a test oscilloscope which may be used at the Transmitter-Receiver.

(2) Pulser Circuit

The output of the modulation amplifier and the pulse shaping tube is applied to the grid of the pulser tube V4 through capacitor C4. When V2 is not conducting, its plate potential approaches +450 volts and capacitors C4 and C3 become charged. When V2 conducts, capacitors C3 and C4 start to discharge through V2. The discharge action of C4 holds the grid of V4 at a negative potential so that it does not conduct. When the positive portion of the On Time wave (Tube V2 cut off) is applied to C4, the grid of V4 rises to a potential which allows V4 to conduct. See Figures 23 and 24. During the cut-off period when V4 is not conducting, no current flows through inductors L1 and L2 and capacitors C3 and C1 become charged to 1200 volts. L1 is a linear inductor of 200 millihenries while L2 is a non-linear coil whose inductance changes suddenly from about 2 henries at zero or very small values of current thru the coil to about 150 microhenries when the coil becomes saturated. It can be seen in Figure 24 that for a narrow range of current around zero the flux density changes rapidly with current, but above saturation (about 20 milliamperes) the flux density is substantially constant. As soon as the current exceeds this critical value, either positive or negative, the coil becomes saturated and current changes are no longer accompanied by changes in flux density. This results in a very low inductance during periods of saturation.

During the period that V4 is conducting, On Time, current flows from the +1200 volt source through inductors L1 and L3, (a pulse shaper coil), through the plate to cathode path in V4 and through resistor R10 to ground. The current rises rapidly at first due to C3 discharging to about 200 volts, and then assumes a gradual rise due to the inductive circuit and finally reaches a value of about 1.1 amperes before being cut off by the positive swing of the pulse from the modulation generator. This cutoff is controlled by the feedback to the cathode of the On Time multivibrator in the modulation generator as follows: When the current through the cathode resistors reaches about 1.1 amperes, the potential of the junction of these resistors and the cathode of V4 reaches a value of about +5 volts. This is fed back to the cathode of V2 in the modulation generator and ends the On Time multivibrator cycle.

While tube V4 is conducting, a biasing current for the non-linear coil flows through resistor R13, inductors L2 and L3, tube V4 and the cathode resistors to ground. Capacitor C1 does not discharge until the current through L2 has reached saturation. At this point the coil reactance becomes almost zero and capacitor C1 discharges rapidly to about 200 volts. After C1 has discharged, the current through L2 is maintained above saturation by the direct current supplied through resistor R13.

When the grid of the 5D21 tube, V4, swings negative, the tube is cut off and flow of current through the linear inductor L1 is abruptly terminated. Due to the high inductance of the linear coil the sudden collapse of its magnetic field creates a voltage which rises to about 18,000 volts. This potential causes current to flow through capacitor C3, inductor L5 (a pulse shaper coil) and diode V5 to ground. A current also attempts to build up through the non-linear inductor L2, capacitor C1 and resistor R16 to ground. This is a reversal in direction of current flow through inductor L2. The current thus decreases from positive saturation through zero (the high inductance range) and increases in the other direction until negative saturation is reached. Because of the large inductance of L2 during this period, about 10 microseconds are required for the coil to reach negative saturation. During this interval the charge on capacitor C3 builds up to about 18,000 volts.

When inductor L2 reaches negative saturation, its reactance suddenly drops and capacitor C3 discharges through inductor L2, capacitor C1 and resistor R16 to ground. This action applies about 12,000 volts across the magnetron. During the period that the voltage is above 10,500, the magnetron impedance drops and it oscillates at its inherent frequency. The length of the current pulse is about 0.3 microseconds and the peak current is about 8.5 amperes. The pulse shape is shown in Figure 23. The entire 18,000 volt charge on capacitor C3 does not reach the magnetron because of voltage drops across L2, C1 and stray capacitances.

When the voltage applied to the magnetron drops below about 10,500, the input impedance of the magnetron suddenly increases and it may produce a train of damped oscillations following the main pulse. These residual oscillations are quenched by the combined action of the bifilar winding of L4 and diode V5. The winding of bifilar coil L4, which is in series with L5 to ground, presents a low impedance shunt to ground across the magnetron when the voltage applied to the magnetron drops below 10,500. This discharges capacitor C3 completely and prevents negative swings of the magnetron cathode. If the magnetron cathode tries to swing positive, diode V5 shorts the current to ground and interrupts the oscillation.

Heater current at 11.8 volts is supplied by transformer T2 through coil L4 to the magnetron. Coil L4 is wound in a bifilar manner so that the magnetic fields of the two windings will cancel each other. This coil also serves as a high frequency choke and permits the use of a low insulation transformer winding for the magnetron heater. The voltage actually applied to the magnetron filament is 6.3 volts except during application of high voltage to the transmitter, and during this period, it is lowered to about 4.5 volts for the purpose of obtaining increased magnetron life. The voltage is decreased by the operation of relay K1 which removes the short circuit from series resistor R17. This relay is operated by 115-volt a-c supplied from the SJ Main Control Unit after the time delay relay has operated.

c. Receiver

A schematic drawing of the receiving equipment is shown in Figure 25. Received radio frequency signals pass from the Antenna through the wave guide and the TR box to the crystal converter. At this point, they are mixed with the output from the beating oscillator to produce a 60-megacycle intermediate frequency. Three stages of IF preamplification are provided in the Oscillator Amplifier subassembly. During actual transmission of signals, the wave guide between the TR box and crystal converter is blocked by the TR tube to protect the crystal.

(1) TR Box

The TR (Transmit-Receive) box is an automatic transmit-receive switch or duplexing device which permits the use of a single antenna for both transmitting and receiving. It consists of a gas filled tube, V5, enclosed in a tuned cavity, with input and output orifice couplings. The input to the TR box is orifice-coupled to the main transmission line between the magnetron and the antenna. The output of the TR box is orifice-coupled to a short section of transmission line which contains the crystal converter and the output probe from the beating oscillator. The function of the TR box is to protect the receiving equipment while a pulse is being transmitted, and then to conduct the returning echo over the reception path to permit conversion into a 60 megacycle intermediate frequency pulse.

The TR tube, V5, is supplied - 1200 volts "keep-alive" which holds the gas in the tube near ionization. During the outgoing pulse, the magnetron delivers its energy to the transmission line and Antenna. At the point where the sharply resonant TR box cavity is coupled to the line, enough power is diverted into the cavity to build up the keep-alive voltage across V5 sufficiently for rapid ionization. This short-circuits the resonant cavity and causes an impedance mismatch between the main transmission line and the branch line to the receiver. The mismatch causes practically all the magnetron energy to be delivered to the Antenna and attenuates that reaching the receiver by about 60 db.

When the echoes return in the form of low power replicas of the transmitted pulses, the magnetron has stopped oscillating and its impedance has changed. Were it not for the ATR box (Paragraph 3c(2)) the magnetron would absorb an appreciable amount of reflected energy. The impedance of the line to the receiver, however, is matched to the main transmission line from the Antenna with the result that the Antenna delivers practically all of its energy through the TR box to the receiver. Since the power of the echo pulses is insufficient to ionize the gas tube, the resonant TR box cavity effectively couples the crystal detector circuit to the main line. The size of the orifices is such that this loading is enough to prevent a standing wave between this point and the Antenna and thus a maximum of received energy is delivered to the crystal. The TR box, when not ionized, introduces a loss of about one db in the receiving line.

(2) ATR Box

The "cold" (nonoscillating) output impedance of a magnetron is different from its impedance when oscillating. However, the impedance change in X-band magnetrons is not as great as in lower frequency magnetrons with the result that some of the received energy is absorbed by the "cold" magnetron. This effect can be greatly reduced by the use of the ATR (anti-TR) box. It is orifice-coupled to the main transmission line and is similar to the TR box except that it has no output connection and no keep-alive voltage.

During transmission, the TR and ATR boxes act similarly in that both become ionized and short circuit their respective cavities. The impedances created are such that very little energy is taken from the main transmission line. During reception neither tube is ionized but otherwise their actions are quite different. The TR box performs as previously described, while the ATR box, which is located an odd number of quarter wave lengths away from the TR box, effectively open-circuits the line to the magnetron at the ATR box. Thus, the ATR box produces the standing wave required to prevent loss of received energy in the magnetron. This arrangement has the additional advantage that no adjustment of line length between the magnetron and the TR box is required to obtain minimum standing wave ratio. The distance between the TR and ATR boxes is fixed in manufacture and requires no adjustment.

Both boxes are provided with cavity tuning adjustments which normally need to be changed only when changing magnetrons.

(3) Beating Oscillator

The receiving equipment used with the ST Radar is of the superheterodyne or double-detection type. The first detector employs a crystal converter and a beating oscillator whose frequency is 60 megacycles above or below the magnetron frequency. The beating oscillator is a 723 A/B reflex type mounted in the Oscillator-Amplifier unit. Its frequency can be changed either by changing the configuration of the built-in resonant cavity (coarse adjustment) or by varying the repeller voltage (fine adjustment).

The circuit connections for the oscillator are shown in Figure 25. The cathode is connected to ground through resistor R12. The cavity and grids are maintained at a potential of +300 volts and the nominal potential of the repeller is in the order of -150 volts. This repeller voltage is used to tune the oscillator and is controlled by potentiometer R11. A pickup loop within the tube provides an output to the wave guide containing the crystal. The crystal current may be controlled by varying the location of the bracket on which the 723 A/B tube is mounted. This changes the BO injection to the RF Line.

(4) Crystal Converter

Physically, the crystal is a small cartridge which plugs into the lower end of the receiving branch of the wave guide. Electrically, it is a rectifier element which, in the presence of two or more frequencies, will create new sum and difference frequencies. In this equipment the crystal is located in a wave guide containing the echo and beating oscillator frequencies. Since these two are 60 megacycles apart, and since one of the products of detection is the difference between two input frequencies, a 60-megacycle frequency will be present at the crystal output. This frequency is selected by a tuned circuit in the IF pre-amplifier. The crystal is tuned by means of two probe tuners mounted on the wave guide near the crystal.

Crystal current is measured by meter M1 which is in a d-c path from the crystal to ground through inductors L1 and L2, and the contacts of jack J3.

(5) Crystal Protection

When the equipment is being started and the TR tube is cold, the first outgoing pulse would come through the TR box with enough energy to injure the crystal were not additional crystal protection provided. During the OFF period, the wave guide between the Transmitter-Receiver and the ST Antenna is sealed off by the gate in the Wave Guide Switching Unit. This protects the crystal from direct signals from other near-by radar equipment. During the ON period, a "keep-alive" voltage of -1200 volts is supplied to one terminal of the TR tube when the filaments in the Transmitter-Receiver are turned on. This voltage holds the tube on the verge of ionization to insure that the TR tube will be immediately ionized by the transmitted pulse or by signals from other near-by radars when the equipment is in operation.

(6) IF Pre-amplifier

This is a three-stage amplifier located in the Oscillator-Amplifier unit in the Transmitter-Receiver. The 60-megacycle output of the crystal converter is delivered over a coaxial cable to a parallel resonant circuit composed of capacitor C19, inductor L3 and the input capacitance of tube V2. The circuit is tuned to 60 megacycles by C19 and inductor L3 is tapped to permit matching the crystal and input cable impedance to that of the tube.

The grid circuits of the second and third stages are tuned to 60 megacycles by capacitors C20 and C21 respectively. The output circuit of the third stage is tuned by capacitor C22, and the output impedance is matched to the 50-ohm coaxial output by tapped inductor L6. All plate circuits are fed in parallel from +120 volts. The output connection to the IF Amplifier in the Selector Unit is made through jack J2.

The cathodes of the second and third stages, V3 and V4, are returned to ground through a variable resistance R53 located in the Selector Unit. This provides control of the gain in the ST pre-amplifier so that it can be balanced with the output of the SJ pre-amplifier.

4. WAVE GUIDE PICK-UP AND ECHO BOX

a. Wave Guide Pick-Up 14ABC

The Wave Guide Pick-Up, shown in Figure 26, is a directional pick-up device for diverting a small portion of the transmitted energy to the Echo Box and returning echoes from the Echo Box to the receiving equipment. It contains a short section of wave guide which is a part of the main transmission line. Another shorter section of wave guide is attached to the first along its narrow dimension and is electrically coupled to it at the center by three small openings. The shorter or pick-up section has a three-resistance-card termination at the end nearest the transmitter and a wave-guide-to-coaxial coupler in the far end. A relay-operated shutter or gate is provided between the orifice section and the coaxial coupler to cut off the transfer of energy to the Echo Box when not in use.

As energy from the magnetron travels through the wave guide to the Antenna, a small portion is diverted into the pick-up section where, if the shutter is open, it is transmitted over the coaxial cable to the Echo Box. The diverted energy reaches the Echo Box and is reflected from surface to surface inside the box and echo pulses return to the pick-up section of wave guide in the Wave Guide Pick-Up Unit. A corresponding portion of this echo pulse energy is diverted into the main transmission line and thence to the receiver where its presence causes echo images to appear on the Range Indicator screen.

The operation of the shutter or gate is controlled by switch S2 in the Selector Control Unit. The operation of switch S2 supplies 115-volt a-c to the Wave Guide Pick-Up Unit. The schematic diagram is shown in Figure 27. The selenium rectifier supplies 38-volt d-c to the 7-ohm portion of the relay coil until the relay operates and opens the short-circuiting switch on the remainder of the winding. The current through the relay winding is materially reduced but is still sufficient to hold the relay in the operated position. When the electrical circuit is opened by switch S2, the relay is returned to its unoperated position and the shutter closed by the spring attached to the relay arm.

b. Echo Box 14AAX

The Echo Box is a cavity into which transmitted energy is introduced over a coaxial line and reflected from surface to surface within the cavity. For a short time, immediately after the transmitter has fired, some of the reflected energy returns to the Wave Guide Pick-Up Unit over the coaxial line and thence to the receiving equipment. The presence of this reflected energy in the receiving equipment causes echoes to appear on the cathode ray indicator screen. The echo box is used in the initial tune-up of the ST Radar and also to check the proper operation of the equipment while the submarine is submerged.

5. WAVE GUIDE SWITCHING UNIT AND DUMMY ANTENNA

a. Wave Guide Switching Unit 24AAF

The Wave Guide Switching Unit, shown in Figure 28, is a device for switching the transmitted energy between the Dummy Antenna and the

ST Antenna. It consists of a Y section of wave guide which is equipped with two relay-controlled shutters or gates for diverting the transmitted energy as desired. The two shutters are linked together so that one shutter opens as the other shutter closes.

The operation of the ST Antenna is controlled by switch S3 in the Selector Control Unit. The schematic diagram of the circuit is shown in Figure 29. The operation of switch S3 supplies 115-volt a-c to the transformer, T1, in the unit. The selenium rectifier supplies 38-volt d-c to the 7-ohm portion of the relay coil. The high current through the relay causes it to operate suddenly and operation opens the short-circuiting contacts on the remainder of the winding. The current through the relay winding is materially reduced but is still sufficient to hold the relay in the operated position. A lead from the 115 volt a-c return is connected through contacts (which close when the relay is operated) to pilot lamp I2 in the Selector Control Unit, tc indicate when the ST Antenna is in use. When the electrical circuit is opened by switch S2, the relay is returned to its unoperated position by a coil spring attached to the link between the two shutters, thus closing off the ST Antenna and affording protection to the crystal from near-by radars.

b. Dummy Antenna 66AHT

The Dummy Antenna is a short section of wave guide into which the transmitted energy is diverted during a warm-up or testing period. The Dummy Antenna is shown in Figure 30. A wedge-shaped piece of ceramic material is inserted in the dummy antenna to provide absorption of the transmitted energy. The energy is dissipated as heat through the fins on the outside.

The two plugs in the sides of the Dummy Antenna are used to close holes which are present in the sides due to a pin used to support the center core during the casting of the unit.

6. PERISCOPE ADAPTER 14ABB

The purpose of the Periscope Adapter is to provide a wave guide connection between the Antenna located in the periscope and the ST Radar components located in the control room so that when the periscope is raised to its operating position, it will function normally with the ST Radar in operation. An assembly drawing is shown in Figure 31. Vertical movement of the periscope through a range of 30 inches, without materially affecting radar operation, is made possible by a sliding section of wave guide, approximately called the "trombone", in the Adapter. Continuous rotation of the periscope is permitted by a rotatable wave guide joint at the lower end of the Adapter. The Periscope Adapter includes three separate parts, 1. the wave guide valve, 2. the eccentric stop and 3. the Periscope Adapter main unit.

a. D-152279 Wave Guide Valve

The wave guide from the control room enters the periscope well horizontally through a special valve which is bolted to a gasketed opening in the wall of the periscope well at a distance of approximately 78 inches below the bottom of the periscope when it is fully extended. If the conning tower should become flooded, the valve may be closed to prevent water entering the control room through the fixed wave guide section leading to the Wave Guide Switch. The valve is operated by means of a box wrench (Williams 1804—25/32 opening) furnished with and attached to the valve by a chain and clip to insure its being immediately available when needed. The wrench may be used on the nut at either end of the valve core. Alignment marks at one end of the valve show the OPEN and CLOSED positions. Exact alignment of the marks in the OPEN position is necessary to avoid transmission loss and standing waves in the valve.

A short section of wave guide terminated by a choke coupling extends from the valve into the periscope well. The face of the coupling is covered by a mica window as a further precaution against dirt and moisture entering the guide at this point. A cylindrical projection bolted to the valve body encloses the short wave guide and choke coupling and acts as a stop when engaged by cam shaped positioning fins on the bottom plate of the Adapter as the periscope is raised. This brings the mating horizontal section of wave guide in the Adapter into proper alignment. The assembly drawing of the wave guide valve is shown in Figure 32.

b. Eccentric Stop

An adjustable stop, consisting of a threaded rod with one end eccentric so that its effective height may be changed by rotation, is mounted through the wall of the periscope well opposite the wave guide valve on a center line which passes through the axis of the periscope. The stop is adjusted to meet the bottom plate of the Adapter coincident with the valve projection on the opposite side of the well. This equalizes the striking force on the Adapter and assures proper alignment of the wave guide. Correct adjustment on the stop is maintained by a jam nut on the outside of the well.

c. Periscope Adapter Main Unit

The main unit is 14-3/4 inches in diameter, 48 inches long and weighs about 220 pounds. It is designed to bolt to a flange on the bottom of the periscope. A wave guide choke coupling projects 3/4 inch above the top of the Adapter in a position 1.781 inches from the axis of the periscope. The choke is provided with a ring gasket which seals against the mating choke coupling on the wave guide section leading from the bottom of the periscope to the antenna.

In the lower end of the Adapter main unit, the wave guide passes through a rotatable joint which permits unlimited rotation of the periscope. Above this joint the wave guide is offset to bring it into alignment with the corresponding section in the periscope. The vertical section from the rotatable joint to the bottom of the periscope is telescoped to allow a vertical movement of the periscope through a range of 30 inches with the ST Radar in operation. Breathing of this trombone section, with attendant condensation of water vapor inside, is prevented by holding the volume constant through a parallel connected pressure equalizing cylinder, open at its lower end only, and fitted with a plunger.

A plate at the top of the unit supports the inner sleeve of the trombone section and the outer cylinder of the Adapter main unit. The outer sleeve of the trombone section and the inner cylinder of the main unit are mounted, together with the rotatable wave guide joint and pressure-equalizing cylinder, on the bottom plate of the unit. These inner and outer sections of the Adapter are normally held fully telescoped by four helical springs. These springs permit vertical movement of the periscope when the bottom of the Adapter is engaged by its stops.

7. POWER SUPPLY AND JUNCTION BOX

a. Power Supply

The power supply for the ST Radar is obtained from the SJ (or SS) Radar with which it is associated.

The 115-volt a-c supply for energizing the filament transformers in the ST Radar is obtained from terminals 7 and 8 in the Main Control Unit on the SJ Radar. The 115-volt Distribution Circuit is shown in

Figure 33. The other power supplies, except the keep-alive voltage, are switched between the ST and SJ Radar Transmitter-Receiver Units by the Selector Unit. The ST Radar obtains its keep-alive voltage from the CRO power supply in the SJ Range Indicator Unit.

b. Junction Box 62ABK

A junction box, shown in Figure 10, is provided for mounting in the control room to facilitate the distribution of circuits to the Transmitter-Receiver Unit, the Wave Guide Pick-Up Unit and the Wave Guide Switch. Ten terminal tubes are provided for the cables, six from the Selector Unit, two from the Transmitter-Receiver Unit and one each from the Wave Guide Pick-Up Unit and the Wave Guide Switch. Four fuses are provided under a removable access door, for each side of the 115-volt circuits to the Wave Guide Pick-Up Unit and the Wave Guide Switching Unit. These fuses are equipped with burn-out indicator lamps which will glow when a fuse is open and the circuit otherwise closed.

Four spare fuses and a fuse puller are mounted on the inside of the access door.

SECTION V

MAINTENANCE

SECTION V — MAINTENANCE

1. GENERAL

The purpose of this instruction is to provide information for maintaing the Model ST Radar equipment. It is not the intent to describe how to remove and replace all spare parts, but merely to describe the procedure where the method is unusually complicated or where special precautions must be taken to prevent damage. As an aid to servicing, tube socket voltages and essential wave shapes for the modulation generator are given later in this section.

Routine checks made regularly by a person thoroughly familiar with Radar Equipment will, in general, obviate most causes of trouble and thereby prevent faulty operation of the equipment. Many complaints of ineffective operation arise from the continued use of old or defective vacuum tubes. It is recommended that, as far as possible, tube failures should be prevented by making replacements as soon as these are indicated by circuit reactions, or by individual tube tests made at regular intervals.

An occasional check of all nuts, screws and bolts should be made and loose one tightened. Electrical connections should also be checked and loose wires resoldered.

2. CONTROLS

A list of adjustable controls used in operation and maintenance is given in Table 1 at the end of Section II.

3. TRANSMITTER

a. Blower and Exhaust Motors (KS-5897)

(1) Bearing and Lubrication

The two ball bearings in each of these motors are of the deep groove type and may be sealed on the inside and open on the end-shield side or sealed on both sides. They are lubricated at the factory with Andock "C" (Standard Oil Company of New Jersey) grease. The bearings, shaft, and bearing housings are so designed that the motor will operate satisfactorily and without harmful loss of lubricants with the motor mounted in any position.

The bearings in these motors should be inspected and if necessary lubricated after each 3000 hours of operation. Proceed as follows:

(a) Remove motor from its mounting, loosen set screws on hub and remove blower fan from shaft. Remove screws holding blower housing to motor. Mark the frame and the shaft side end shield with a pencil line to temporarily show the assembly arrangement.

(b) Remove the end shield on the shaft end by removing the four through bolts and prying the end shield off, tapping the corners with a screwdriver if necessary to start it. Do not remove the end shield from the other end where the stator winding leads come out.

(c) Pull out the rotor complete with the bearings on the shaft. The bearings have a slip fit in the end housings and a press fit on the shaft. Note location of any washers that may have been used to control end play. (The metal-clad washer goes with the cork side toward the end shield

(d) Whenever the armature assembly is removed, wipe bearing housings with a clean, dry cloth and note that its surface is smooth and free from grit, dirt, or any foreign matter that would interfere with bearing fit. Before reassembly coat bearing housings sparingly with oil or bearing grease for surface protection.

(e) DO NOT RENEW BEARINGS. If a bearing becomes excessively noisy, loose on the shaft, or otherwise unsatisfactory, install a new motor. Bearings sealed on both sides cannot be relubricated and if not in satisfactory condition, the entire motor must be replaced.

(f) If the bearings are unsealed on one side and there is ample grease over the balls and separator and it is soft without signs of caking or carbon dust, no additional lubrication will be required.

(g) If hard, caked, or dirty, the lubricant should be carefully removed from the accessible part of the bearing with an orange stick or a tooth pick. In case the grease is extremely hard, a screwdriver with its end covered by a cloth can be used. Follow with a stiff brush but make sure that no loose bristle from the brush is left in the interior or on the side of the bearing. Next fill the unshielded or unsealed recess with grease; but to avoid any possible overheating of the motor, do not attempt to force any lubricant into bearing interior. Use grease per Navy specification 14L3 grade III or C, hard or Andock "C", Standard Oil Company of New Jersye, N.Y.C.

(h) Replace the rotor, restoring washers to their original positions.

(i) Replace the end shield, lining it up in its original position.

(j) Spin the rotor by hand to check that it rotates freely. If it binds, tap the end shield gently to insure that it is properly seated, then insert and tighten the through bolts and check again for free rotation.

(k) Put the fan on the motor, following the reverse of the procedures outlined above. Note that the fan has provision for two Allen set screws, but the motor shaft has only one flat. Use only one set screw. Remove the other, if present, and discard it. Connect motor to power and check operation.

(2) Failure to start Capacitor.

(a) If the motor fails to start, first see that rotor turns freely. Next, check with a lamp across motor terminals that voltage is present, and see that motor and capacitor leads are not broken. Check that capacitor is across black and red leads. If no defects have been found install a new capacitor.

b. Oscillator Amplifier and RF Line

The Oscillator-Amplifier and the RF Line, commonly called plumbing, may be removed from the Transmitter-Receiver Unit to facilitate inspection and servicing of the unit. To remove the plumbing, proceed as follows:

(1) Remove the cable plugs from the Oscillator-Amplifier and the magnetron filament control relay.

(2) Remove the coaxial lead from the IF output jack on the Oscillator-Amplifier.

(3) Loosen the six captive screws, three on the mounting between the TR and ATR boxes, two on the right and one on the left of the Oscillator-Amplifier.

(4) Release the rubber sleeve covering the coupling between the magnetron and the transmission line.

(5) Remove plumbing by moving it forward slightly and out the right side of the Transmitter-Receiver Unit.

c. Keep Alive Voltage

The keep-alive voltage for the TR tube is supplied by the CRO power supply in the SJ Range Indicator through a resistor R115 located in the Indicator Unit. This voltage also passes through resistor R14 in the TR Line unit before being applied to the cap of the TR tube.

If the crystal current suddenly drops to about one half its normal value or below, the presence of keep-alive voltage at the tube cap should be checked. This voltage, measured with a voltmeter with 20,000 ohms per volt, will be around -450 volts. The keep-alive current, if a suitable meter is available for measuring, should be between 100 and 125 microamperes. If no voltage is present at the tube cap the continuity of the circuit should be checked before replacing the TR tube.

d. TR Box and ATR Box

(1) TR Box

The TR (Transmit-Receive) Box is the coupling device between the main transmission line and the RF line, and contains the TR tube for crystal protection. If it is impossible to obtain crystal current by adjusting the beating oscillator it would indicate that the crystal had been damaged due to the TR tube failing to ionize. If the near-in echoes do not fill in properly on the scope it would indicate that the recovery time of the TR tube is too long. In either case the tube should be replaced. To replace the TR tube proceed as follows:

(a) Loosen the TR Box clamping screw, release the ratchets holding spring, and remove the TR Box by pulling it forward.

(b) Loosen the clamping sleeves with the special box wrench furnished in the tool kit on inside of Transmitter-Receiver access door.

(c) Separate the two halves of the TR Box by pulling them apart squarely.

CAUTION: Do not bend the fingers provided for guiding the halves of the box together.

(d) Remove the 724B tube and replace with a new one. The cap end of the tube should be toward the stenciled side of the box. The discs on the tube fit on the outside of the center guides.

(e) Line up the fingers and guides and fit the TR box halves together.

(f) Rotate the 724B tube by grasping the cap to determine proper positioning of the discs on the tube.

(g) Replace clamping sleeves and tighten locking nuts with the box wrench.

(h) Replace TR Box in proper position between the wave guides and tighten the TR Box clamping screw.

(2) ATR Box

The ATR Box contains a gas filled tube which ionizes during the transmitted pulse. This presents a low impedance which is in series with the transmission line. If the tube fails to ionize during the transmitted pulse a high impedance will be in series with the transmission line and the overall-system performance will be down. If this condition is encountered, the ATR tube should be replaced. Follow the same procedure outlined above for the TR tube.

e. Crystal

If the crystal has been damaged by the absence of keep-alive voltage or by a defective TR tube, it should be replaced. The crystal is taken out by removing the knurled cap on the RF line in the rear of the Oscillator-Amplifier Unit. Access to the crystal is obtained by pulling the Transmitter-Receiver Unit from its case until the safety catch engages and putting the hand under the Oscillator-Amplifier from the right side.

The new crystal should be kept enclosed in the foil wrapper for protection against microwave and static charge until just before placement in the equipment. When the new crystal has been placed in the knurled cap, the cap should be contacted to the grounded framework of the transmitter and the hand holding the crystal kept in contact with ground until the crystal has been reinserted into the RF line.

4. WINDING DATA

a. Oscillator Amplifier Coils

(1) L1 and L2 (B-12206-1)

Wind one full layer with about #33 AWG E copper wire.(Number of turns and exact size of wire are not critical). Solder ends of wire to terminals.

(2) L3 (B-17327-2)

Remove enamel from #30 AWG E copper wire for a length of approximately 1/8 inch at tap location. Wrap bare portion of wire once around tap wire close to the form and solder. Close wind the coil in a single layer 3-1/2 turns, starting from the tap and winding counterclockwise to the bottom terminal on the shoulder of the form, and 6-1/2 turns from the tap to the other terminal in clockwise direction, looking at the top end in each case.

(3) L4 and L5 (B-17327-1)

Close wind in a single layer 8-1/2 turns of #30 AWG E copper wire. Start winding at index slot on the shoulder end and wind clockwise looking at the top end.

(4) L6 (B-17327-3)

Remove enamel from #31 AWG E copper wire for a length of approximately 1/8 inch at the tap location. Wrap bare portion of the wire once around the tap wire close to the form and solder. Close wind the coil in a single layer 6 turns, starting from the tap and winding counterclockwise to the bottom terminal, on the shoulder of the form, and 9-1/2 turns from the tap to the other terminal in a clockwise direction, looking at top end in each case.

b. IF Amplifier Coils

(1) L1 and L3 (BL-19955-1)

Close wind in a single layer 10 turns of #26 AWG E copper wire. Start winding at the index slot at the shouldered end and wind clockwise looking at the top end.

(2) L2 (BL-19955-2)

Close wind in a single layer 11 turns of #26 AWG E copper wire. Start winding at the index slot at the shouldered end and wind clockwise looking at the top end.

c. Transmitter-Receiver Filament Transformer KS-9369

Winding Information

Winding	Number of Turns Per Layer	Total	Wire
1-2	62 approx	310 Exact	22 AWG E
3-4	--	18 Exact	18 AWG E
5-6	--	14-1/2 Exact	15 AWG E
7-8	--	33-1/2 Exact	22 AWG E
9-10	37 approx	75 Exact	20 AWG E

d. Modulation Generator Filament Transformer KS-9038

Winding Information

Winding	Number of Turns Per Layer	Total	Wire
1-2	76 approx	755 approx	26 AWG E
3-4	12 exact	47 exact	17 AWG E

e. Wave Guide Pick-Up and Wave Guide Switching Unit Auto Transformer - KS-15074 L01

Winding Information

Winding	Number of Turns Per Layer	Total	Wire
Full	-	325 Exact	20 AWG E

Terminal 2 tapped on at 133 turns

f. Wave Guide Pick-Up and Wave Guide Switching Unit Solenoid - KS-15073 L05

Winding Information

Winding	Number of Turns Per Layer	Total	Wire
Inside	-	550 approx	27 AWG E
Outside	-	1800 approx	36 AWG E

g. Magnetron Filament Control Relay - KS-5910 L01

Winding Information

Winding	Number of Turns Per Layer	Total	Wire
Full		5000 approx	36 AWG E

5. PERISCOPE ADAPTER

a. Lubrication of Periscope Adapter

The Periscope Adapter is equipped with two bearing rings, one attached to the outside of the inner cylinder near its top and the other attached to the inside of the outer cylinder near its bottom. A grease fitting is provided in the outer cylinder opposite the nameplate and is between the two bearings when the adapter is fully retracted. The Periscope Adapter should be relubricated after each three months of operation as follows:

(1) With the Adapter fully extended wipe off all grease on the inner cylinder.

(2) Return the Adapter to its fully retracted position and relubricate at the grease fitting with Beacon M285 or AN-G-3A grease.

> NOTE Only a small amount of grease is necessary. An excessive amount may cause grease to be deposited on the waveguide coupling between the Adapter and the Periscope.

(3) After relubrication the Periscope should be raised and lowered several times to distribute the grease on the cylinder walls in the Adapter.

b. Mica Windows at Wave Guide Chokes

The wave guides at the bottom of the Periscope Adapter and at the extension of the wave guide value into the periscope well are each equipped with mica windows. These mica windows should be carefully cleaned with lens paper each time the periscope is raised to put the Model ST Radar in operation. This cleaning requires a light touch to prevent damage to the mica windows and should be performed by the radar technician.

6. MODULATION GENERATOR

The modulation generator is located in the Selector Unit and furnishes the SYNC PULSE to the Range Indicator and Range Unit and the ON TIME wave for controlling the conducting time of the 5D21 tube in the ST Transmitter-Receiver Unit.

a. Tube Socket Voltages and Resistances

The tables following give the tube socket voltages and resistances of the modulation generator with all adjustments set for normal operation. The measurements were made using an RCA Volt-ohmyst Jr., and are typical values.

b. Wave Shapes

The wave shapes shown in Figures 2A, 2B and 2C, were taken on a DuMont Oscilloscope Model 208 and a Volt Box as seen in Figure 34. The following preparation of the oscilloscope is recommended:

Strap the two horizontal plates (D1 and D2) to their respective horizontal amplifier terminals at the back of the oscilloscope. Connect the bottom vertical plate (D3) to ground. Connect the top vertical plate (D4) to a variable d-c voltage source capable of going up to 300 volts such as shown in Figure 34. Connect the other side of the d-c source to a clip probe.

Switch the coarse frequency switch of the oscilloscope to 1500 and connect the SYNC output of the modulation generator to the External Sync Signal terminal of the scope and turn Sync Signal Selector Switch to External. Ground the oscilloscope to a common ground on the Selector Unit.

With the probe grounded and the variable d-c voltage at zero mark the location of the trace on the screen with ink or a china-marking pencil. This is known as the "ground" line and represents the position of zero potential. The voltage of any point on a wave may be obtained by varying the volt box potentiometer until the point in question on the wave coincides with the ground line on the scope. The reading on the meter is an indication of the voltage. The reversing switch allows the reading of negative voltages.

TUBE SOCKET VOLTAGES

TUBE		TERMINALS							
Designation	Type	1	2	3	4	5	6	7	8
V1	6SN7GT	-46	+220	0	-29	+143	0	*	*
V2	6SN7GT	+1.2	+270	+32	+21	+190	+32	*	*
V3	6SN7GT	+0.1	+244	+30	-3.6	+244	+30	*	*
V4	6V6GT/G	--	*	+108	+200	-26	--	*	+2.9
V5	6SN7GT	+10.8	+295	+48	+48	+146	+48	*	*
V6	6V6GT/G	--	*	+292	+295	+0.1	--	*	+32
V7	6V6GT/G	--	*	+300	+300	+95	--	*	+106

TUBE SOCKET RESISTANCES
(ALL POWER OFF)

TUBE	TERMINALS							
Designation	1	2	3	4	5	6	7	8
V1	0.4 meg	0.14 meg	0	0.55 meg	45000	0	0	0
V2	50000	23000	2600	3.0 meg	12500	2600	0	0
V3	1.0 meg	12000	5400	0.47 meg	12000	5400	0	0
V4	--	0	8000	12000	0.47 meg	--	0	60
V5	8800	14000	320	0.8 meg	13200	320	0	0
V6	--	0	4000	10000	1.0 meg	--	0	10000
V7	--	0	3000	3000	0.22 meg	--	0	1.0 meg

* Voltage between these terminals is 6.3 volts a-c

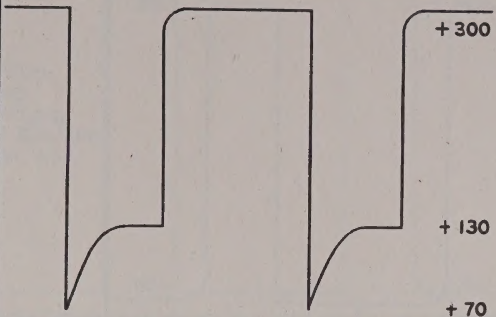
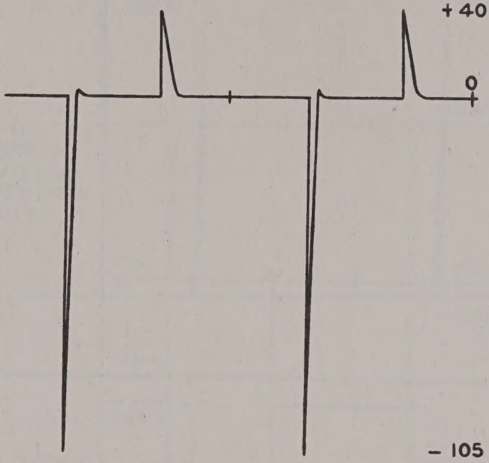
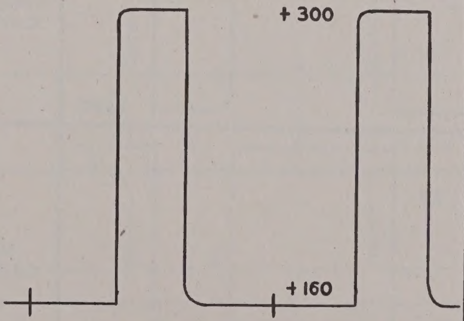
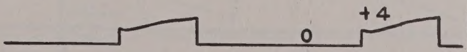
TUBE	WAVE SHAPES	COMMENTS
V1 PLATE 2		OUTPUT OF PULSE RATE MULTIVIBRATOR OR BASE OSCILLATOR
V2 GRID 1		TRIGGERING PULSE APPLIED TO ONTIME MULTIVIBRATOR
V2 PLATE 5		OUTPUT OF ON TIME MULTIVIBRATOR
V2 CATHODE 3 AND 6		FEEDBACK

Figure 2A—Modulation Generator Wave Shapes—ESO–990888

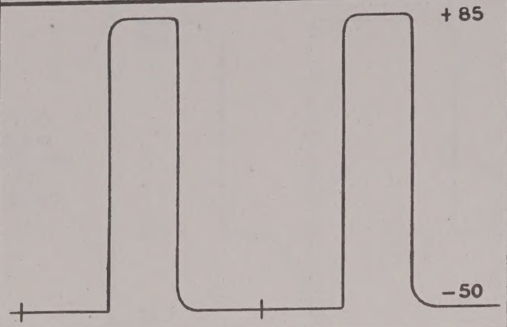
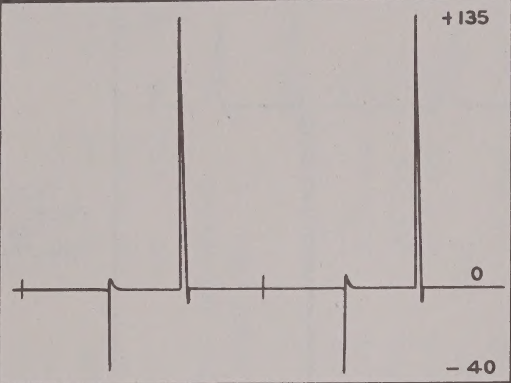
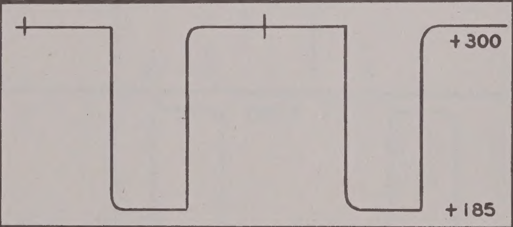
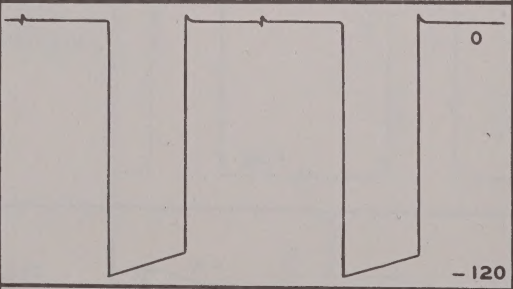
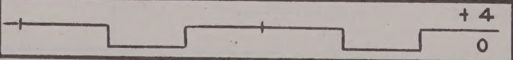
TUBE	WAVE SHAPES	COMMENTS
V3 GRID 4		OUTPUT OF ONTIME MULTIVIBRATOR APPLIED TO ONE GRID OF MIXER TUBE
V3 GRID I AND V5 PLATE 5		OUTPUT OF PRE-KNOCK MULTIVIBRATOR APPLIED TO ONE GRID OF MIXER TUBE
V4 PLATES 2 AND 5		OUTPUT OF MIXER TUBE APPLIED TO ONTIME CATHODE FOLLOWER
V4 GRID 5		INPUT TO ONTIME CATHODE FOLLOWER
V4 CATHODE 8		ONTIME OUTPUT

Figure 2B—Modulation Generator Wave Shapes—ESO—990888

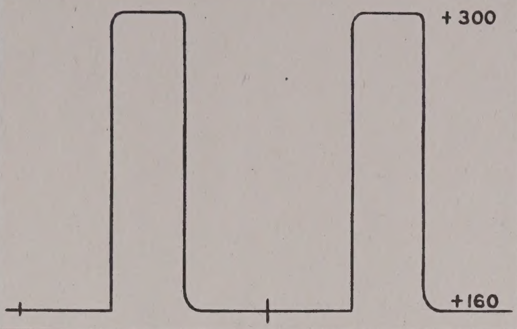
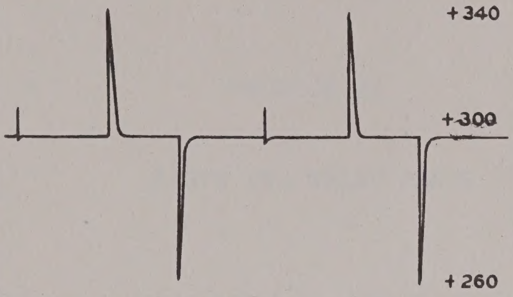
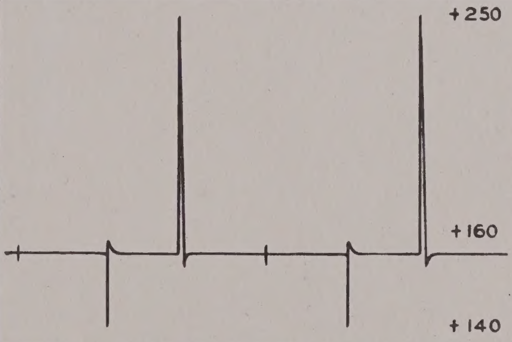
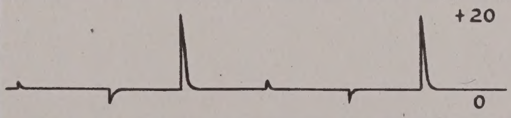
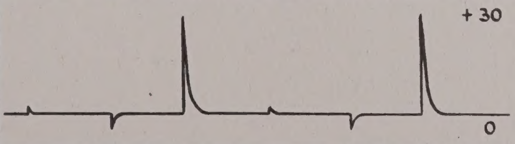
TUBE	WAVE SHAPES	COMMENTS
V2 PLATE 5		OUTPUT OF ONTIME MULTIVIBRATOR APPLIED TO PRE-KNOCK MULTIVIBRATOR
V5 PLATE 2		EFFECT OF TRIGGERING PULSE APPLIED TO PRE-KNOCK MULTIVIBRATOR
V5 PLATE 5		OUTPUT OF PRE-KNOCK MULTIVIBRATOR
V6 GRID 5		INPUT TO SYNC CATHODE FOLLOWER
V6 CATHODE 8		SYNC PULSE OUTPUT

Figure 2C—Modulation Generator Wave Shapes—ESO–990888

SECTION VI

PARTS AND SPARE PARTS

TABLE I

LIST OF MAJOR UNITS FOR D-152220

RADAR EQUIPMENT—ST

Navy Type Designation	Name of Major Units	Unit Reference Number	Assembly Drawing	Specification Number
CW-24AAH	Selector Unit	2	BXX-18501	D-152272
	Amplifier	2A	BR-18396	D-152382
CW-43ACU	Radar Transmitter-Receiver	3	BXX-12500	D-152271
	Oscillator-Amplifier	3A	BR-12520	D-151694
	RF Line	3B	BR-12490	D-151695
CW-23AFP	Selector Control Unit	4	BX-16458	D-152274
CGP-14ABB	Periscope Adapter	5	BXX-16470	D-152273
	Wave Guide Valve	5A	BX-16504	D-152279
CGP-24AAF	Wave Guide Switching	7	BR-19552	D-152277
CGP-14AAX	Echo Box	8	BR-17332	D-152349
	Wave Guide Complement	9	BL-19509	D-152275
CGP-14ABC	Wave Guide Pick-up	10	BR-19554	D-152280
CW-62ABK	Junction Box	11	BXX-19073	D-152381
CW-66AHT	Dummy Antenna	12	BL-409280	X-66325-A
CW-10376	Mounting Frame	13	BXX-17774	D-152372

FIELD CHANGES—MODIFICATION KITS (Note 1)

SJ-1 Adaptation for ST	14A	BL-20317	D-152383
Replacing 6L6 Tube with 6Y6 (Regulated Rectifier)	14B	BL-18355	D-152315
Increased Signal Overload (Range Indicator)	14C	BL-19249	D-152320
Improved Sweep Centering (Range Indicator)	14D	BL-19337	D-152326

Note 1: Spares will be supplied as part of the Kits and are to be associated with Equipment Spare Parts for Radar Equipment SJ-1.

TABLE II
PARTS AND SPARE PARTS LIST BY NAVY TYPE DESIGNATION FOR D-152220 RADAR EQUIPMENT—ST

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	B	C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			MOTORS, GENERATORS												
3	B1	Blower motor for Transmitter-Receiver	MOTOR: Continuous duty, 115 volts, 60 cycles, 3,400 rpm, single phase a-c, permanent split capacitor, totally enclosed, reversible ball bearing induction, approx. 3 watt output			20	KS-5897 List 01		058		2	4	6	3	B1, B2
3	B2	Exhaust blower motor for Transmitter-Receiver	MOTOR: Same as B1, Unit 3												
			CAPACITORS												
2	C1	Coupling	CAPACITOR: Mica, 10,000 mmf ±20%, 300 volts d-c working			62	CM40B103M		115		1	2	3	2	C1, C11, C18
2	C2	Coupling	CAPACITOR: Mica, 430 mmf ±5%, 500 volts d-c working			62	CM20C431J		105A		1	1	1	2	C2
2	C3	By-pass	CAPACITOR: Paper, 10,000 mmf ±20%, 400 volts d-c working			1	404C		095		2	6	10	2 3	C3, C4, C13 C9
2	C4	By-pass	CAPACITOR: Same as C3, Unit 2												
2	C5	Coupling	CAPACITOR: Paper, 0.1 mf ±10%, 600 volts d-c working	-481001-10		17 51 55	DYRT-6010 XDMRTW6-.1-10 RLON-610	ESA-682063-2	090		1	2	3	2	C5
2	C6	Time constant	CAPACITOR: Mica, 300 mmf ±5%, 500 volts d-c working			62	CM20C301J		104		1	1	1	2	C6
2	C7	Coupling	CAPACITOR: Mica, 390 mmf ±20%, 500 volts d-c working			62	CM20C391M		105		1	1	1	2	C7
2	C8	Coupling	CAPACITOR: Mica, 100 mmf ±5%, 500 volts d-c working			62	CM20C101J		102		1	1	1	2	C8
2	C9	Coupling	CAPACITOR: Mica, 3,000 mmf ±5%, 500 volts d-c working			62	CM30C302J		112		1	1	1	2	C9
2	C10	Coupling	CAPACITOR: Mica, 5,100 mmf ±5%, 500 volts d-c working			62	CM35B512J		113		1	1	1	2	C10
2	C11	Coupling	CAPACITOR: Same as C1, Unit 2												
2	C12	By-pass	CAPACITOR: Paper, 0.5 mf ±10%, 600 volts d-c working	-481002-10		17 51 55	DYRT-6050 XDMRTW6-.5-10 RLON-650	ES-682063-4	091		1	2	3	2	C12
2	C13	By-pass	CAPACITOR: Same as C3, Unit 2												
2	C15	Coupling	CAPACITOR: Mica, 51 mmf ±5%, 500 volts d-c working			62	CM20C510J		101		1	1	1	2	C15
2	C18	By-pass	CAPACITOR: Same as C1, Unit 2												
2 2	C19A and C19B	By-pass By-pass	CAPACITOR: Paper, dual unit, 0.5 mf—0.5 mf ±15%, 600 volts d-c working	-481896-15		3 17 51	630B-.5-.5 DYRB-6055 2XDMRW6-.5-15	ES-682063-91	096		1	2	3	2	C19A and C19B

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			CAPACITORS (Continued)												
2	C20	Time constant	CAPACITOR: Mica, 2,000 mmf ±5%, 500 volts d-c working			62	CM30C202J		111		1	1	1	2	C20
2	C21	By-pass	CAPACITOR: Paper, 50,000 mmf ±10%, 600 volts d-c working	-481311-10		17 51 52	DYR-6005 XDMRW6-.05-10 PBTS-396A	ES-682063-51			1	2	3	2	C21
2A	C1	Coupling	CAPACITOR: Ceramic, 5 mmf ±0.25 mmf, 500 volts d-c working			62	CC21CJ050C		097		1	1	1	2A	C1
2A	C2	Coupling	CAPACITOR: Ceramic, 51 mmf ±10%, 500 volts d-c working			62	CC21SL510K		100		1	1	2	2A	C2, C16
2A	C3	Coupling	CAPACITOR: Ceramic, 6 mmf ±0.25 mmf, 500 volts d-c working			62	CC21CJ060C		098		1	1	1	2A	C3
2A	C4	By-pass	CAPACITOR: Mica, 500 mmf ±100 mmf, 500 volts d-c working			22	Similar to 370B	BA-10104-7	106		5	15	24	2A 3A	C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15 C2, C4, C5, C7, C8, C10, C15, C16, C17, C23, C24, C25
2A	C5	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C6	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C7	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C8	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C9	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C10	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C11	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C12	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C13	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C14	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C15	By-pass	CAPACITOR: Same as C4, Unit 2A												
2A	C16	Coupling	CAPACITOR: Same as C4, Unit 2A												
2A	C17	Tuning	CAPACITOR: Adjustable, consisting of glass tube, silver plated into separate sections and so arranged that threaded stud can be moved in and out to desired capacity; maximum direct capacity not less than 2 mmf	-481673		1	D-163093		093		2	7	14	2A 3A	C17, C18, C19 C19, C20, C21, C22
2A	C18	Tuning	CAPACITOR: Same as C17, Unit 2A												
2A	C19	Tuning	CAPACITOR: Same as C17, Unit 2A												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			CAPACITORS (Continued)												
3	C1	Coupling	CAPACITOR: Mica, 6,200 mmf ±5%, 500 volts d-c working			62	CM35C622J		108		1	1	1	3	C1
3	C2	Coupling	CAPACITOR: Mica, 8,200 mmf ±10%, 500 volts d-c working			62	CM40A822K		109		1	1	1	3	C2
3	C3	Coupling	CAPACITOR: Mica, 10,000 mmf ±20%, 500 volts d-c working			62	CM25A103M		110		1	2	2	3	C3, C10
3	C4	Coupling	CAPACITOR: Paper, 0.5 mf ±10%, 600 volts d-c working	-48704-A10		17 51 55	DYRB-6050 XDMRBW6-.5-10 RLOL-650	ES-682063-85	089		1	2	3	3	C4
3	C5	By-pass	CAPACITOR: Mica, 10,000 mmf ±10%, 2,500 volts d-c working			62	CM60A103K		114		1	1	1	3	C5
3	C6	Coupling	CAPACITOR: Paper, 2 mf ±10%, 600 volts d-c working	-48403-B10		3 17 55	630-2 DYR-6200 RLO-602	ES-682063-56	087		1	2	3	3	C6
3	C7	By-pass	CAPACITOR: Paper, 1.25 mf ±10%, 220 volts a-c, Dykanol "C" filled	-481821-10		17	KS-5897 List 02		094		1	3	5	3	C7, C8
3	C8	By-pass	CAPACITOR: Same as C7, Unit 3												
3	C9	By-pass	CAPACITOR: Same as C3, Unit 2												
3	C10	By-pass	CAPACITOR: Same as C3, Unit 3												
3A	C1	By-pass	CAPACITOR: Mica, 500 mmf ±100 mmf, 500 volts d-c working			22	370J	B-10104-15	107		1	3	4	3A	C1, C13, C14, C18
3A	C2	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C3	Coupling	CAPACITOR: Ceramicon, 50 mmf ±0.5 mmf, 500 volts d-c working			22	N750K50±5	B-10062-9	099		1	3	4	3A	C3, C6, C9, C12
3A	C4	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C5	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C6	Coupling	CAPACITOR: Same as C3, Unit 3A												
3A	C7	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C8	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C9	Coupling	CAPACITOR: Same as C3, Unit 3A												
3A	C10	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C11	By-pass	CAPACITOR: Mica, 200 mmf ±10%, 500 volts d-c working			62	CM20B201K		103		1	1	1	3A	C11
3A	C12	Coupling	CAPACITOR: Same as C3, Unit 3A												
3A	C13	By-pass	CAPACITOR: Same as C1, Unit 3A												
3A	C14	By-pass	CAPACITOR: Same as C1, Unit 3A												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			CAPACITORS (Continued)												
3A	C15	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C16	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C17	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C18	By-pass	CAPACITOR: Same as C1, Unit 3A												
3A	C19	Tuning	CAPACITOR: Same as C17, Unit 2A												
3A	C20	Tuning	CAPACITOR: Same as C17, Unit 2A												
3A	C21	Tuning	CAPACITOR: Same as C17, Unit 2A												
3A	C22	Tuning	CAPACITOR: Same as C17, Unit 2A												
3A	C23	By-pass	CAPACITOR: Same as C4, Unit 2A												
3A	C24	DC blocking	CAPACITOR: Same as C4, Unit 2A												
3A	C25	Filter	CAPACITOR: Same as C4, Unit 2A												
7	C1	Spark suppression	CAPACITOR: Paper, 0.5 mf ±10%, 600 volts d-c working			17 51 55	DYR-6050 XDMRW6-.5-10 RLO-650	ES-682063-65	092		1	3	5	7 10	C1 C1
10	C1	Spark suppression	CAPACITOR: Same as C1, Unit 7												
			FUSES												
11	F1	Wave Guide Switch supply	FUSE: Cartridge-type, 250 volts (maximum) at 3.2 amperes, 2" long, 9/16" wide, 1/2" thick (4 additional fuses are mounted in Junction Box)			14	4032	BA-10021-50	068		40	80	200	11	F1, F2, F3, F4 and Spares
11	F2	Wave Guide Switch return	FUSE: Same as F1, Unit 11												
11	F3	Wave Guide Pick-up supply	FUSE: Same as F1, Unit 11												
11	F4	Wave Guide Pick-up return	FUSE: Same as F1, Unit 11												
			LAMPS												
4	I1	SJ-1 Power Indicator	LAMP: Incandescent, 115 volts, 6 watts	TS-37		25		BA-10010-7	029		6	12	18	4	I1, I2, I3
4	I2	Dummy Antenna Power Indicator	LAMP: Same as I1, Unit 4												
4	I3	ST Power Indicator	LAMP: Same as I1, Unit 4												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			JACKS												
2	J4	Mod. Gen. On-time	JACK: Coaxial, approx. 1-1/16" long, 0.620 ±0.003" wide	-49194	RE 49F 188B	1 6 48	D-162865 88-1R JPT-5	BA-10085-1	116		9	17	34	2 2A 11	J4, J5, J6, J7, J8, J9, J10, J11, J12, J13 J1, J2, J3, J1, J2, J3, J4
2	J5	Mod. Gen. Feed-back	JACK: Same as J4, Unit 2												
2	J6	Sync. output to Range Indicator	JACK: Same as J4, Unit 2												
2	J7	Sync. input from SJ Transmitter	JACK: Same as J4, Unit 2												
2	J8	SJ-1 IF Input	JACK: Same as J4, Unit 2												
2	J9	IF output to Range Indicator	JACK: Same as J4, Unit 2												
2	J10	Feedback	JACK: Same as J4, Unit 2												
2	J11	On-time	JACK: Same as J4, Unit 2												
2	J12	ST IF Input	JACK: Same as J4, Unit 2												
2	J13	Sync. output to Range Unit	JACK: Same as J4, Unit 2												
2A	J1	ST IF Input	JACK: Same as J4, Unit 2												
2A	J2	SJ-1 IF Input	JACK: Same as J4, Unit 2												
2A	J3	IF Output	JACK: Same as J4, Unit 2												
3	J1	On-time	JACK: Brass, 50 ohm, coaxial, terminating jack			1	D-169552		130		2	3	6	3 3A	J1, J2, J2
3	J2	Feedback	JACK: Same as J1, Unit 3												
3	J3	Test	JACK: Pin, plated per Navy spec. AN-QQ-S-91, 3/8" diameter, approx. 3/4" long			7	1866	BO-10133-1	128		1	1	2	3	J3
3	J4	Connects power leads to Transmitter	RECEPTACLE: (Shell only) 1-9/32" across plate 31/32" between mounting holes with 6.1 finish; add 3025A medium gray enamel finish; this is used with				AN-3102-32 (modified)	BA-28409	122		1	1	1	3	J4, J5
		Holds contacts of Power Jack	INSERT ASSEMBLY				Similar to American Phenolic Corp. Pin Insert 9732-810P	BA-12213-2	127		1	1	1		
3	J5	Connects power leads to Transmitter	RECEPTACLE: Same as J4, Unit 3 with Insert, Item 122												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			JACKS (Continued)												
3	J7	115 Volts Convenience Outlet	RECEPTACLE: Grooved to fit panels from 0.040" to 0.062" thick; resiliency of tempered steel retaining ring takes up variations in metal thickness			6	61-F	BA-10159-1	134		1	1	2	3	J7
3A	J2	IF Pre-Amplifier	JACK: Same as J1, Unit 3												
3A	J3	Connects Power to Oscillator-Amplifier	PLUG: Low loss Bakelite, octal type, 9 prong for panel 0.093" thick (Attached to cable BO-17915)			6	CP9TM	BA-10116-10	132		2	2	4	3A 3B	J3 J6
3B	J1	Crystal Output Jack	JACK ASSEMBLY: Coaxial, approx. 1/2" diameter, 1-5/8" long			1		B-17473-1	129		1	1	2	3B	J1
3B	J6	Connects Power for Relay Circuit and Keep-alive	PLUG: Same as J3, Unit 3A												
8	J1	Transmits and receives energy from Echo Box	JACK: Coaxial, brass, silver plated, approx. 1-3/4" long (discard nut)			1	D-169745		131		2	2	4	8 10	J1 J1
10	J1	Echo Box connection	JACK: Same as J1, Unit 8												
10	J2	Internal Pick-up Jack	JACK: Coaxial, 50 ohm, microwave connector, matched impedance, provided with plate for mounting	-49206		1	D-163475		Part of 154						
11	J1	IFF Sync.	JACK: Same as J4, Unit 2												
11	J2	ST IF	JACK: Same as J4, Unit 2												
11	J3	On-time	JACK: Same as J4, Unit 2												
11	J4	Feedback	JACK: Same as J4, Unit 2												
			RELAYS												
3A	K1	To operate crystal protection shutter	RELAY: 115 volts, 60 cycles, 450 ohms resistance, 2PDT contact	-29183		1	KS-5910 List 01				1	2	3	3A	K1
7	S1	Dummy Antenna Switch	RELAY: Rotary solenoid; 3PDT with auxiliary cutout and contacts; 25 volts d-c, starting winding 7-1/2 ohms, running winding 225 ohms			44 47	KS-15073 List 01		069		1	2	3	7 10	S1 S1
10	S1	Echo Box Switch	RELAY: Same as S1, Unit 7												
			COILS												
2A	L1	Tuning	COIL: Tuned, 10 turns of No. 26 AWG E wire			1		BL-19955-1	085		1	1	2	2A	L1, L3
2A	L2	Tuning	COIL: Tuned, 11 turns of No. 26 AWG E wire			1		BL-19955-2	086		1	1	1	2A	L2

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			COILS (Continued)												
2A	L3	Tuning	COIL: Same as L1, Unit 2A												
3A	L1	Choke	COIL: One full layer of No. 33 AWG E wire			1		B-12206-1	081		1	1	2	3A	L1, L2
3A	L2	Choke	COIL: Same as L1, Unit 3A												
3A	L3	Input tuning	COIL: Retard, close wound, single layer, 2 windings, one of 3-1/2 turns, one of 6-1/2 turns of No. 30 AWG E copper wire			1		B-17327-2	082		1	1	1	3A	L3
3A	L4	Tuning	COIL: Retard, close wound, single layer 8-1/2 turns of No. 30 AWG E copper wire			1		B-17327-1	083		1	1	2	3A	L4, L5
3A	L5	Tuning	COIL: Same as L4, Unit 3A												
3A	L6	Output tuning	COIL: Retard, close wound, single layer, one of 6 turns and one of 9-1/2 turns of No. 31 AWG E wire			1		B-17327-3	084		1	1	1	3A	L6
			METERS												
3	M1	Crystal Current Meter	MILLIAMMETER: 1.5 milliamperes d-c, 3-1/2" diameter for steel panel (AWS drawing C-39.2-11)			63	MR34W1R5DCMA		060		1	1	1	3	M1
			PLUGS												
2	P1	ST IF Input connects with J1, Unit 2A	PLUG: Coaxial cable connector, approx. 1-17/32" long, 11/16" diameter	-49195	RE 49F 167D	1 9 48	D-162864 7131 PLPT-5	BA-10086-1	117		8	15	30	2 8 10	P1, P2, P3, P4, P5, P6, P7, P8 P9, P10, P11, P12, P13 P1 P1
2	P2	SJ-1 IF Input connects J2, Unit 2A	PLUG: Same as P1, Unit 2												
2	P3	IF Output connects with J3, Unit 2A	PLUG: Same as P1, Unit 2												
2	P4	Mod. Gen. On-time connects with J4, Unit 2	PLUG: Same as P1, Unit 2												
2	P5	Mod. Gen. Feed-back, connects with J5, Unit 2	PLUG: Same as P1, Unit 2												
2	P6	Sync. Output, connects with J6, Unit 2	PLUG: Same as P1, Unit 2												
2	P7	Sync. Input connects with J7, Unit 2	PLUG: Same as P1, Unit 2												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			PLUGS (Continued)												
2	P8	IF Input, connects with J8, Unit 2	PLUG: Same as P1, Unit 2												
2	P9	IF Output, connects with J9, Unit 2	PLUG: Same as P1, Unit 2												
2	P10	Feedback, connects with J10, Unit 2	PLUG: Same as P1, Unit 2												
2	P11	On-time, connects with J11, Unit 2	PLUG: Same as P1, Unit 2												
2	P12	IF Input ST, connects with J12, Unit 2	PLUG: Same as P1, Unit 2												
2	P13	Sync. Output, connects with J13, Unit 2	PLUG: Same as P1, Unit 2												
3	P1	Connects with J1, Unit 3 on Tube Chassis	PLUG: Small 50 ohm, coaxial plug, part of Plug and Cable Assembly, B-14160-3			1	D-166366		Part of 150A						
3	P2	Connects with J2, Unit 2 on Tube Chassis	PLUG: Small 50 ohm, coaxial plug, part of Plug and Cable Assembly, B-14160-3			1	D-166366		Part of 150A						
3	P3	Connects with J3, Unit 3A on Oscillator-Amplifier	SOCKET: Mica filled Bakelite and CAP: Same as Amphenol Plug Cap 3-17-D except finish			6 1	S9TM	ES-613021-17 BA-28417	138 132		1 2	1 2	2 4	3A 3B	P3 P6
3	P4	Connects with J4, Unit 3	PLUG: Designed in accordance with Army-Navy Procurement Spec. AN-W-C-591 with INSERT ASSEMBLY			6 1	AN-3108-32 (modified)	B-12213-3							
3	P5	Connects with J5, Unit 3	PLUG: Same as P1, Unit 3												
3	P6	Connects power for Relay and Keep-alive	PLUG: Same as J3, Unit 3A												
3A	P1	Crystal Output, connects with J1, Unit 3B	PLUG: Same as P1, Unit 3						Part of 151						
3A	P2	Output Pre IF Amplifier, connects with J2, Unit 3	PLUG: Same as P1, Unit 3												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			PLUGS (Continued)												
8	P1	Connects coaxial line to Echo Box, connects with J1, Unit 8	PLUG: Same as P1, Unit 2												
10	P1	Internal Wave-Guide Pick-up Unit, connects with J1, Unit 10	PLUG: Same as P1, Unit 2												
10	P2	Echo Box connection, connects with J2, Unit 10	PLUG: Coaxial	-49205		1	D-163469		Part of 154						
11	P1	IFF Sync. J1, Unit 11	PLUG: Coaxial cable connector, approx. 1-1/2" long, 11/16" diameter	-49190				BA-10086-1	117A		2	4	8	11	P1, P2, P3, P4
11	P2	ST IF, connects with J2, Unit 11	PLUG: Same as P1, Unit 11												
11	P3	On-time, connects with J3, Unit 11	PLUG: Same as P1, Unit 11												
11	P4	Feedback, connects with J4, Unit 11	PLUG: Same as P1, Unit 11												
			RESISTORS												
2	R1	Grid bias	RESISTOR: Composition, 0.22 megohm ±5%, 1/2 watt			64	RC 21BF 224J		211		1	3	5	2	R1, R16
2	R2	Plate	RESISTOR: Composition, 10,000 ohms ±5%, 1/2 watt			64	RC 21BF 103J		193		1	3	5	2	R2, R17
2	R3	Plate	RESISTOR: Composition, 5,100 ohms ±5%, 2 watts			64	RC 41BF 512J		187		2	6	10	2	R3, R18, R37, R38
2	R4	Screen	RESISTOR: Composition, 0.82 megohm ±5%, 1/2 watt			64	RC 21BF 824J		218A		1	2	3	2	R4
2	R5	Plate	RESISTOR: Composition, 1,000 ohms ±10%, 1 watt			64	RC 31BF 102K		176		1	2	3	2	R5
2	R6	Screen	RESISTOR: Composition, 6,800 ohms ±10%, 1/2 watt			64	RC 21BF 682K		190		1	2	3	2	R6
2	R7	Grid bias Pre-knock Control	POTENTIOMETER: Composition, linear, 20,000 ohms ±10%, 2 watts, 5/8" shaft with screwdriver slot, 1/2" bushing length			4	J	BA-10034-445	227		1	3	5	2	R7
2	R8	Grid bias	RESISTOR: Composition, 8,200 ohms ±5%, 1/2 watt			64	RC 21BF 822J		192		1	2	3	2	R8
2	R9	Cathode bias	RESISTOR: Composition, 3,300 ohms ±5%, 1/2 watt			64	RC 21BF 332J		182		1	2	3	2	R9

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			RESISTORS (Continued)												
2	R10	Grid bias	RESISTOR: Composition, 1.0 megohm ±10%, 1/2 watt.			64	RC 21BF 105K		220		1	3	5	2	R10, R42
2	R11	Cathode bias	RESISTOR: Composition, 10,000 ohms ±10%, 1/2 watt			64	RC 21BF 103K				1	2	3	2	R11
2	R12	Load	RESISTOR: Composition, 22,000 ohms ±5%, 1/2 watt			64	RC 21BF 223J		199		1	2	3	2	R12
2	R13	Plate	RESISTOR: Composition, 47,000 ohms ±5%, 1/2 watt			64	RC 21BF 473J		202		1	3	5	2	R13, R23
2	R14	Plate	RESISTOR: Composition, 5,600 ohms ±5%, 2 watts			64	RC 41BF 562J		189		1	3	5	2	R14, R15
2	R15	Plate	RESISTOR: Same as R14, Unit 2												
2	R16	Grid bias	RESISTOR: Same as R1, Unit 2												
2	R17	Plate	RESISTOR: Same as R2, Unit 2												
2	R18	Plate	RESISTOR: Same as R3, Unit 2												
2	R19	Grid bias	RESISTOR: Composition, 3.3 megohms ±5%, 1/2 watt			64	RC 21BF 335J		221A		1	2	3	2	R19
2	R20	Plate	RESISTOR: Composition, 10,000 ohms ±10%, 1 watt			64	RC 31BF 103K		195		1	2	3	2	R20
2	R21	Plate	RESISTOR: Wire wound, 5,000 ohms ±5%, Navy Style D, Grade 1, Class 1	-63085-F		52	35F	ES-682068-49	155A		1	2	3	2	R21
2	R22	Grid bias, On-time control	POTENTIOMETER: Composition, linear, 5,000 ohms ±10%, 2 watts, 5/8" shaft with screwdriver slot, locking type, 1/2" bushing length			4	J	BA-10034-416	225		1	3	5	2	R22
2	R23	Grid bias	RESISTOR: Same as R13, Unit 2												
2	R24	Voltage dropping	RESISTOR: Composition, 0.1 megohm ±10%, 1/2 watt			64	RC 21BF 104K		206		1	2	3	2	R24
2	R25	Grid bias	RESISTOR: Composition, 0.39 megohm ±5%, 1/2 watt			64	RC 21BF 394J		215		1	3	5	2	R25, R26
2	R26	Grid bias	RESISTOR: Same as R25, Unit 2												
2	R27	Grid bias, coarse pulse rate control	POTENTIOMETER: Composition, linear 0.2 megohm ±10%, 2 watts, 5/8" shaft with screwdriver slot, locking type, 1/2" bushing length			4	J	BA-10034-418	228		1	3	5	2	R27
2	R29	Grid bias	RESISTOR: Composition, 0.1 megohm ±10%, 2 watts			64	RC 41BF 104K		209A		1	2	3	2	R29
2	R30	Cathode bias	RESISTOR: Composition, 2,700 ohms ±5%, 2 watts			64	RC 41BF 272J		180A		1	2	3	2	R30
2	R31	Grid bias	RESISTOR: Composition, 0.47 megohm ±10%, 1/2 watt			64	RC 21BF 474K		216		1	3	5	2	R31, R33

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			RESISTORS (Continued)												
2	R32	Cathode bias	RESISTOR: Composition, 5,600 ohms ±10%, 1/2 watt			64	RC 21BF 562K		188		1	2	3	2	R32
2	R33	Grid bias	RESISTOR: Same as R31, Unit 2												
2	R34	Cathode bias	RESISTOR: Composition, 6,800 ohms ±10%, 2 watts			64	RC 41BF 682K		191		1	2	3	2	R34
2	R35	ST repeller voltage	RESISTOR: Composition, 0.1 megohm ±20%, 1/2 watt			64	RC 21BF 104M		207		1	3	5	2	R35, R48
2	R36	Load	RESISTOR: Composition, 56 ohms ±10%, 1/2 watt			64	RC 21BF 560K		166		1	2	3	2	R36
2	R37	Plate	RESISTOR: Same as R3, Unit 2												
2	R38	Plate	RESISTOR: Same as R3, Unit 2												
2	R40	Screen	RESISTOR: Composition, 47 ohms ±10%, 1/2 watt			64	RC 21BF 470K		165		1	2	3	2	R40
2	R41	Grid bias	RESISTOR: Composition, 0.68 megohm ±10%, 1/2 watt			64	RC 21BF 684K		218		1	2	3	2	R41
2	R42	Cathode bias	RESISTOR: Same as R10, Unit 2												
2	R43	Grid bias	RESISTOR: Composition, 0.33 megohm ±10%, 1/2 watt			64	RC 21BF 334K		214		1	2	3	2	R43
2	R44	Voltage divider	RESISTOR: (External meter): Wire wound, 1.5 megohms ±1/2%, 1.5 kilovolts rating, used with M3, Unit G, SJ-1 equipment			29 52 60	MFB155		222		1	2	3	2	R44
2	R45	Voltage divider	RESISTOR: Composition, 10,000 ohms ±20%, 1/2 watt			64	RC 21BF 103M		194		1	2	3	2	R45
2 2	R46A and R46B	ST repeller adjustment ST repeller adjustment	POTENTIOMETER: Composition, dual unit, linear, 1.0 megohm—1.0 megohm ±20%, 2 watts, 13/16" shaft with screwdriver slot, 3/8" bushing length			4	JJ	BA-10034-446	231		1	3	5	2	R46A and R46B
2 2	R47A and R47B	SJ-1 repeller adjustment SJ-1 repeller adjustment	POTENTIOMETER: Composition, linear, dual unit, 0.3 megohm—0.3 megohm ±20%, 2 watts, 13/16" shaft with screwdriver slot, 3/8" bushing length			4	JJ	BA-10034-447	229		1	3	5	2	R47A and R47B
2	R48	Repeller voltage dropping	RESISTOR: Same as R35, Unit 2												
2	R49	Grid bias	RESISTOR: Composition, 47,000 ohms ±10%, 1/2 watt			64	RC 21BF 473K		203A		1	2	3	2	R49
2	R50	Grid bias	RESISTOR: Composition, 0.18 megohm ±5%, 1/2 watt			64	RC 21BF 184J		210		1	2	3	2	R50
2	R51	Grid bias	RESISTOR: Composition, 0.27 megohm ±5%, 1/2 watt			64	RC 21BF 274J		213		1	2	3	2	R51
2	R52	Screen	RESISTOR: Composition, 10,000 ohms ±5%, 2 watts			64	RC 41BF 103J		193A		1	2	3	2	R52

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	B	C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			RESISTORS (Continued)												
2	R53	IF gain equalizer	POTENTIOMETER: Wire wound, linear, 2,000 ohms ±10%, 4 watts, 1/2" shaft with screwdriver slot, 3/8" bushing length, locking type			66	25	BA-10034-301			1	3	5	2	R53
2	R54	Grid bias	RESISTOR: Composition, 4,700 ohms ±10%, 1/2 watt			64	RC 21BF 472K				1	2	3	2	R54
2A	R2	Plate	RESISTOR: Composition, 1,500 ohms ±10%, 1/2 watt			64	RC 20BF 152K		178		1	2	3	2A	R2
2A	R3	Plate	RESISTOR: Composition, 2,700 ohms ±10%, 1/2 watt			64	RC 20BF 272K		181		1	3	5	2A	R3, R12
2A	R4	Input termination	RESISTOR: Composition, 22 ohms ±5%, 1/2 watt			64	RC 20BF 220J		163		1	3	5	2A	R4, R9
2A	R5	Cathode bias	RESISTOR: Composition, 270 ohms ±10%, 1/2 watt			64	RC 20BF 271K		171		1	3	5	2A	R5, R7
2A	R6	Voltage dropping	RESISTOR: Composition, 100 ohms ±10%, 1/2 watt			64	RC 20BF 101K		169		1	3	5	2A	R6, R8
2A	R7	Cathode Bias	RESISTOR: Same as R5, Unit 2A												
2A	R8	Voltage dropping	RESISTOR: Same as R6, Unit 2A												
2A	R9	Input termination	RESISTOR: Same as R4, Unit 2A												
2A	R10	Input termination	RESISTOR: Composition, 100 ohms ±5%, 1/2 watt			64	RC 20BF 101J				1	2	3	2A	R10
2A	R11	Cathode bias	RESISTOR: Composition, 1,000 ohms ±20%, 1/2 watt			64	RC 20BF 102M		175		1	2	3	2A	R11
2A	R12	Input	RESISTOR: Same as R3, Unit 2A												
3	R1	Plate	RESISTOR: Composition, 0.1 megohm ±10%, 1 watt			64	RC 30BE 104K		208		1	2	3	3	R1
3	R2	Cathode bias	RESISTOR: Composition, 1,800 ohms ±10%, 1/2 watt			64	RC 20BE 182K		180		1	2	3	3	R2
3	R3	Plate	RESISTOR: Composition, 22,000 ohms ±10%, 1 watt			64	RC 40BE 223K		201		1	2	3	3	R3
3	R4	Grid bias	RESISTOR: Composition, 0.56 megohm ±10%, 1/2 watt			64	RC 21BE 564K		217		1	2	3	3	R4
3	R5	Screen	RESISTOR: Composition, 10,000 ohms ±10%, 2 watts			64	RC 40BE 103K		196		1	2	3	3	R5
3	R6	Grid bias	RESISTOR: Composition, 0.1 megohm ±10%, 1/2 watt			64	RC 20BE 104K		205		1	2	3	3	R6
3	R7	Plate	RESISTOR: Wire wound, 10,000 ohms ±5%, Navy Style D, Grade 1, Class 1	-63090-F		52	35F	ES-682068-48	156		1	2	3	3	R7
3	R8	Plate	RESISTOR: Composition, 22,000 ohms ±10%, 1/2 watt			64	RC 20BE 223K		200		1	2	3	3	R8
3	R9	Grid bias	RESISTOR: Composition, 0.56 megohm ±10%, 2 watts			64	RC 40BE 564K				1	2	3	3	R9

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			RESISTORS (Continued)												
3	R10	Cathode bias	RESISTOR: Wire wound, 5 ohms ±10%, 2 watts	-63705-10		29	BW-2	BA-10003-3	159		1	2	3	3	R10
3	R11	Screen	RESISTOR: Wire wound, 1,500 ohms ±5%, Navy Style D, Grade 1, Class 1	-63078-F	RE 13A 372J	52	35F	ES-682068-54	155		1	2	3	3	R11
3	R12	Plate	RESISTOR: Composition, 1,000 ohms ±10%, 1/2 watt			64	RC 20BE 102K		173		1	3	5	3 3A	R12 R6
3	R13	Plate	RESISTOR: Wire wound, 18,000 ohms ±5%, Navy Style D, Grade 1, Class 2	-63094-E	RE 13A 372J	26,29 45,59		ES-682068-52	157		1	2	3	3	R13
3	R15	Grid bias	RESISTOR: Composition, 68 ohms ±10%, 1/2 watt			64	RC 20BE 680K		167		1	2	3	3	R15
3	R16	Sync pulse	RESISTOR: Wire wound, 1 ohm ±10%, 1 watt	-63703-10		29	BW-1	B-10003-2	158		1	2	3	3	R16
3	R17	Voltage	RESISTOR: Wire wound, 3.15 ohms ±5%, Navy Style F, Grade 1, Class 2	-631000-E	RE 13A 372J	26,59 45,52 29	10F	ES-682068-123	160		1	2	3	3	R17
3	R18	Pulse shape	RESISTOR: Composition, 10,000 ohms ±10%, 1/2 watt			64	RC 20BE 103K				1	3	5	3 3A	R18 R15
3	R19	Cathode bias	RESISTOR: Composition, 100 ohms ±10%, 2 watts			64	RC 40BE 101K				1	3	5	3	R19, R20
3	R20	Cathode bias	RESISTOR: Same as R19, Unit 3												
3A	R1	Cathode bias	RESISTOR: Composition, 270 ohms ±10%, 1/2 watt			64	RC 20BE 271K		170		2	6	10	3A	R1, R4, R7, R12
3A	R2	Plate	RESISTOR: Composition, 1,200 ohms ±10%, 1/2 watt			64	RC 20BE 122K		177		2	5	8	3A	R2, R5, R10
3A	R3	Screen	RESISTOR: Composition, 100 ohms ±10%, 1/2 watt			64	RC 20BE 101K		168		2	5	8	3A	R3, R9, R13
3A	R4	Cathode bias	RESISTOR: Same as R1, Unit 3A												
3A	R5	Plate	RESISTOR: Same as R2, Unit 3A												
3A	R6	Cathode bias	RESISTOR: Same as R12, Unit 3												
3A	R7	Cathode bias	RESISTOR: Same as R1, Unit 3A												
3A	R8	Repeller bias	RESISTOR: Composition, 47,000 ohms ±10%, 1/2 watt			64	RC 20BE 473K		203		1	2	3	3A	R8
3A	R9	Screen	RESISTOR: Same as R3, Unit 3A												
3A	R10	Plate	RESISTOR: Same as R2, Unit 3A												
3A	R11	Repeller bias adjust	POTENTIOMETER: Composition, linear, 1.0 megohm ±20%, 2 watts, 5/8" shaft with screwdriver slot, 1/2" bushing length			4	J	BA-10034-164	230A		1	3	5	3A	R11
3A	R12	Cathode bias	RESISTOR: Same as R1, Unit 3A												
3A	R13	Screen	RESISTOR: Same as R3, Unit 3A												
3A	R15	By-pass	RESISTOR: Same as R18, Unit 3												
3B	R14	Voltage dropping	RESISTOR: Composition, 4.7 megohms ±10%, 1 watt			64	RC 30BE 475K				1	2	3	3B	R14
4	R1	Pulse repetition	POTENTIOMETER: Composition, linear, 20,000 ohms ±10%, 2 watts, 1-11/16" round shaft, 3/8" bushing length			4	J	BA-10034-426	226		1	3	5	4	R1

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			RECTIFIERS												
7	RV1	Rectifier	VARISTOR: Selenium disc, output 38 volts at 0.2 ampere (part of KS-15074 Rectifier)			46	KS-15074 List 02	ES-529006	055		2	4	4	7 10	RV1 RV1
10	RV1	Rectifier	VARISTOR: Same as RV1, Unit 7												
			SWITCHES												
2	S1	ST, SJ-1 Transfer	SWITCH: 16-pole transfer			54	KS-15064 List 01		063		1	1	1	2	S1
2	S2	Door	SWITCH: Door type with CONTACT ASSEMBLY: Phenol plastic, wax impregnated, brass insert, approximately 1-15/16" long, 1-1/8" wide			1 1		B-14709-4 B-14709-2	064A 067		1 1	1 1	1 2	2 2 3	S2 Part of S2 Part of S2
2	S3	Service	SWITCH: Toggle, D.P.S.T., 125-volt modified Cutler Hammer switch with lever 25/32" long, 3/16" wide			18	7525 (modified)	BO-14896-1	065		1	1	2	2 3	S3 S1
3	S1	Door	SWITCH: Same as S3, Unit 2												
3	S2	Door	SWITCH: Door type with CONTACT ASSEMBLY: Same as Item 067			1		B-14709-3	066		1	1	1	3	S2
4	S1	ST, SJ-1 Transfer control switch	SWITCH: Toggle, S.P.D.T., one round knurled and one hexagonal mounting nut	-24105		8	80618	ESA-682035-1	061		1	2	3	4	S1, S2, S3
4	S2	Echo Box control switch	SWITCH: Same as S1, Unit 4												
4	S3	Dummy Antenna control switch	SWITCH: Same as S1, Unit 4												
			TRANSFORMERS												
2	T1	Filament	TRANSFORMER: Primary (1-2) 115 volts, 50 or 60 cycles, secondary (3-4) 6.6 amperes at 6.3 volts, electrostatic shield between primary and secondary windings; over-all dimensions 3-11/16" x 2-13/16" x 4-3/8" high			2 50 53	KS-9038		070		1	2	3	2	T1
3	T1	Modulation	NETWORK: Modulation			1	D-169300		141		1	1	1	3	T1
3	T2	Filament	TRANSFORMER: Primary (1-2) 115 volts, 55-65 cycles; secondary (3-4) 6.3 volts at 2.5 amperes; secondary (5-6) 5.0 volts at 5.5 amperes; secondary (7-8) 11.8 volts at 1.1 ampere; secondary (9-10) 26.0 volts at 2.2 amperes; electrostatic shield between primary and secondary; over-all dimensions 3-7/16" x 4-19/32" x 5-5/16" high			1	KS-9369		071		1	2	3	3	T2

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS ITEM NO.	BOX NO	QUANTITY A	B	C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			TRANSFORMERS (Continued)												
7	T1	Auto transformer for Wave Guide Switch	TRANSFORMER: Auto, disc type, 115 volts, 60 cycles, output 46 volts at 0.250 ampere			46	KS-15074 List 01	ES-529006	054		1	1	2	7 10	T1 T1
10	T1	Auto transformer for Wave Guide Pick-up	TRANSFORMER: Same as T1, Unit 7												
			VACUUM TUBES												
2	V1	Base oscillator M.V.	VACUUM TUBE: Twin triode amplifier	JAN()6SN7-GT		65	JAN()6SN7-GT		074		10	15	0	2 3	V1, V2, V3, V5 V1
2	V2	On-time M.V.	VACUUM TUBE: Same as V1, Unit 2												
2	V3	Mixer	VACUUM TUBE: Same as V1, Unit 2												
2	V4	Cathode follower	VACUUM TUBE: Beam power amplifier	JAN()6V6-GT/G		65	JAN()6V6-GT/G		075		18	12	0	2 3	V4, V6, V7 V4
2	V5	Pre-knock M.V.	VACUUM TUBE: Same as V1, Unit 2												
2	V6	Synch generator	VACUUM TUBE: Same as V4, Unit 2												
2	V7	Voltage regulator	VACUUM TUBE: Same as V4, Unit 2												
2A	V1	Amplifier	VACUUM TUBE: R-f pentode sharp cut-off	JAN()6AK5		65	JAN()6AK5		072		10	15	0	2A 3A	V1, V2 V2, V3, V4
2A	V2	Amplifier	VACUUM TUBE: Same as V2, Unit 2A												
3	V1	Amplifier	VACUUM TUBE: Same as V1, Unit 2												
3	V2	Amplifier	VACUUM TUBE: Same as V4, Unit 2												
3	V3	Clipper	VACUUM TUBE: Twin diode	JAN()6H6		65	JAN()6H6		073		2	3	0	3	V3
3	V4	Amplifier	VACUUM TUBE: Special purpose, triode, pulsed amplifier			1	5D21		078		3	6	0	3	V4
3	V5	Rectifier	VACUUM TUBE: High vacuum diode	JAN()705A		65	JAN()705A		076		2	3	0	3	V5
3	V6	Oscillator	VACUUM TUBE: Magnetron			1	2J50		077		3	6	0	3	V6
3A	V1	Oscillator	VACUUM TUBE: Continuous wave oscillator			1	723A/B		079		3	6	0	3A	V1
3A	V2	Amplifier	VACUUM TUBE: Same as V1, Unit 2A												
3A	V3	Amplifier	VACUUM TUBE: Same as V1, Unit 2A												
3A	V4	Amplifier	VACUUM TUBE: Same as V1, Unit 2A												
3B	V5	Gas tubes	VACUUM TUBE: Gas switching			1	724B		080		6	12	0	3B	V5, V6
3B	V6	Gas tubes	VACUUM TUBE: Same as V5, Unit 3B												

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			SOCKETS												
2	X1		SOCKET: Vacuum tube, octal, ceramic			41 57	35-C-1-E 105001-INS	ES-678315-2	139		5	5	10	2 3	X1, X2, X3, X4, X5, X6, X7 X1, X2, X3
2	X2		SOCKET: Same as X1, Unit 2												
2	X3		SOCKET: Same as X1, Unit 2												
2	X4		SOCKET: Same as X1, Unit 2												
2	X5		SOCKET: Same as X1, Unit 2												
2	X6		SOCKET: Same as X1, Unit 2												
2	X7		SOCKET: Same as X1, Unit 2												
2A	X1		SOCKET: Vacuum tube, ceramic parts with impregnating wax 3032A finish, Procedure G, approximately 1-1/8" overall			16	9834 WI	BA-10112-3	136		3	3	5	2A 3A	X1, X2 X2, X3, X4
2A	X2		SOCKET: Same as X1, Unit 2A												
3	X1		SOCKET: Same as X1, Unit 2												
3	X2		SOCKET: Same as X1, Unit 2												
3	X3		SOCKET: Same as X1, Unit 2												
3	X4		SOCKET: Vacuum tube, 3-3/8" OD x 3" high	-49378		47		ES-678078-1	118		1	1	2	3	X4, X5
3	X5		SOCKET: Same as X4, Unit 3												
3A	X1		SOCKET: Vacuum tube, metal, octal style, insulating wafers are wax impregnated and equipped with only 4 contacts			41	39-P-1A-X	KS-10067			1	1	1	3A	X1
3A	X2		SOCKET: Same as X1, Unit 2A												
3A	X3		SOCKET: Same as X1, Unit 2A												
3A	X4		SOCKET: Same as X1, Unit 2A												
4	X1		SOCKET: Panel light (red)			19	DVT-9629SAO	BA-10195-111	137		1	2	3	4	X1, X2, X3
4	X2		SOCKET: Same as X1, Unit 4												
4	X3		SOCKET: Same as X1, Unit 4												
			CRYSTALS												
3B	Y1	Crystal Detector	CRYSTAL			1	IN23	D-168356	056		10	20	50	3B	Y1

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			ADDITIONAL PARTS AND SPARE PARTS												
			MISCELLANEOUS												
2		Mounting for R21, Unit 2	FUSE CLIP: 60 amperes, 250 volts, 1-5/32" long x 0.705" wide			13	Similar to 2222	BA-18513-2	004A		1	1	2		
2		Mounting for R21, Unit 2	FUSE CLIP: 60 amperes, 600 amperes, 1-1/4" long x 0.726" wide			13	Similar to 2262	BA-18513-1	005		1	1	2		
2		Cable Sealing gland	GASKET: Rubber or synthetic rubber, Navy Spec. 33R1, Class 2, approximately 6" long, 1-5/16" wide, 1/4" thick			1		BL-18546	021		1	2	4		
2		Cable Sealing gland	GASKET: Rubber or synthetic rubber, Navy Spec. 33R1, Class 2, approximately 6-3/16" long, 1-5/16" wide, and 1/4" thick			1		BL-18548	022		1	2	4		
2		Seals Units mounting screws	GASKET: Rubber, Navy Spec. 33R1, Class 2, 1-1/4" dia., 3/8" dia. hole			1		ES-691693-6	026		4	8	16	2 4	
2		Shockmounts Unit from ship	SHOCKMOUNT: Approximately 3" x 3", 15 lbs. load rating			1		BA-13458-57	031		2	6	12		
2		Spring for safety catch	SPRING: Carbon steel wire, Navy Spec. A-228, 15 full turns, close wound, centrally located			1		BA-19872	037		1	2	5		
2		Mounts R44 and R45, Unit 2	TERMINAL BOARD: Glass bonded mica, AWS.C75.6, Grade L-4, approximately 6-5/8" long and 1-7/8" wide, 7/32" thick			1		BL-18540	040		1	1	2		
2		Mounts high voltage terminals	TERMINAL BOARD: Ceramic, Navy Spec. RE 13A 317F, Grade G, wax impregnated No. 3032 finish, Procedure E, approximately 3-5/16" long, 3/16" wide, 5 terminals			39	37105 (modified)	B-18932	041		7	13	26		
2		For int. octal tube	TUBE CLAMP: For int. octal tube, 1.275" diameter			11	926B	BA-10178-10	043		2	2	4		
2			WASHER: Synthetic rubber, per Navy Spec. 33R1, Class 2, 9/16" O.D., 1/4" I.D., 1/32" thick			1		ES-682281-2	048		4	8	16		
2		Seal panel to the cover	WEATHER STRIP: Synthetic rubber, Navy Spec. 33R9, approximately 60" x 1/4" x 3/16" thick			1		BA-19510	049		1	2	4		
			CABLES, WIRE												
2		Selector Unit wiring forms	CABLE: 7-conductor No. 16 AWG stranded wire, KS-8640, matched portions of cable given two layers of tape and covered with shellac			1		BL-19483	152		1	1	2		
2		Selector Unit wiring forms	CABLE: 4-conductor No. 16 AWG stranded wire, KS-8640, matched portions of cable given two layers of tape and covered with shellac			1		BL-19484	153		1	1	2		

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	B	C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			MISCELLANEOUS												
2A			TUBE SHIELD: Brass, zinc plate finish, approximately 1-3/8" long, 55/64" dia.			16	8660	BA-10113-1	045		2	2	3	2A 3A	
			AMPLIFIER UNITS												
2A			Amplifier			1	D-152382	BR-18396			0	1	1		
			MISCELLANEOUS												
3		For blower motors	BLOWER HOUSING: High impact, plastic, for clockwise rotation, undrilled			35	KS-15052 List 03		002		1	4	6		
3		For blower motors	BLOWER WHEEL: 24 blade No. 000 Sirocco type, metal clockwise rotation for 0.1875" motor shaft			35	KS-15052 List 10		003		1	4	6		
3		Nut for connecting high voltage post on the network	CORONA CAP: Nickel plated brass, 7/8" diameter, 9/16" high			1		B-13794-6	004		1	1	2		
3		For R7, R11 and R13, Unit 3	FUSE CLIP: Spring temper phosphor bronze, Navy Spec. 4B14, 1-7/32", 13/16" wide, 250 volts, 31-60 amperes		RE 38AA 116D	34 56		BO-29149-2	007A		1	1	3		
3		For R7, R11 and R13, Unit 3	FUSE CLIP: Spring temper phosphor bronze, Navy Spec. 4B14, 1-7/32" long, 13/16" wide, 250 volts, 31-60 amperes		RE 38AA 116D	28		BO-29149-1	007B		1	1	3		
3		Shockmounts Crystal Current Meter	SHOCK RING: Neoprene, Navy Spec. 33RIE, 4-19/32" O.D., 2.804" I.D. x 0.090" thick			1		B-14280-3	034		1	1	2		
3			TOOL KIT ASSEMBLY: Consists of 3 offset hexagonal wrenches, 1/4, No. 4 and No. 8 Long Series Allen Mfg. Co., a (BO-11815-3) wrench and a (BO-13664-6) wrench assembly, screwdriver assembly (BO-13918-3), socket assembly (BO-13918-7) and a bag			1		B-14160-2	042		1 set	1 set	2 sets		
3		Lock tube	TUBE LOCK: Int. octal			1	D-152370-K		044A		1	1	1		
3		For sealing around tie rod hole	WASHER: Neoprene, Navy Spec. 33RIE 7/8" O.D., 5/16" I.D., 1/32" thick			1		B-14551-7	046		4	8	16		
			PLUGS, RECEPTACLES, ETC.												
3		Covers plug	CAP: Plug					B-28417	124A		1	1	1		
3		Connection from network to 5D21 tube	CONNECTOR ASSEMBLY: Spring with tube cap, approximately 4" x 2" x 3/4"			1		B-13794-1	125		1	1	2		
3		Connection from network to 705 tube	CONNECTOR ASSEMBLY: Spring with tube cap, approximately 3-1/2" x 2" x 3/4"			1		B-13794-2	126		1	1	2		

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			INSULATORS												
3		Part of mounting for R13, Unit 3 Resistor	MOUNTING STRIP: Glass bonded mica (BTL-PR3-1AWS-75-6, Grade L-4, wax impregnated 3032, Procedure E, ESA-639545-3), 5-3/16" x 1" x 1/8" thick, 2 holes, 0.1875" diameter, 1-1/2" apart			1		B-17603-1	146		1	1	1		
3		Part of mounting for R13, Unit 3	MOUNTING STRIP: Glass bonded mica, 5-3/16" x 1" x 3/16"; 2 holes (countersunk) 0.2187" diameter and 2 holes 0.1875" diameter					B-17603-2	147		1	1	1		
			CABLES—WIRE												
3		Magnetron heater connector	CABLE ASSEMBLY: 4" long, cable No. 18 AWG E wire, 2 plugs at one end and 2 terminals at other end			1		B-13863-1	149		1	1	2		
3		50 ohm coaxial connector to power jack	CABLE ASSEMBLY: Coaxial, RG-55/U Cable, Navy Spec. RE-9245, approximately 22" long, Plug D-166366 at one end. This cable used with P1, Unit 3 and P2, Unit 3			1		BO-14160-4	150A		2	3	6		
3		Used with P4, P5, Unit 3	CABLE ASSEMBLY: Special, used with P4 and P5, Unit 3			1		BO-20124			2	3	6		
			MISCELLANEOUS												
3A			TUBESHIELD: Brass, zinc plate finish; approximately 1-3/8" long, 55/64" diameter						045					3A 2A	
			AMPLIFIER UNITS												
3A			AMPLIFIER: Oscillator			1	D-151694	BR-12520			0	1	1		
			CABLES—WIRE												
3A		Connector from crystal to Pre IF	CABLE ASSEMBLY: Coaxial, RG-55/U Cable, Navy Spec. RE-9245, approximately 5-1/4" long, Plug D-166366 P1, Unit 3A at one end, Connector B-11207-6 on other end.			1		B-17766-1	151		1	1	2		
			SPECIAL R-F DEVICES												
3B			R-F LINE			1	D-151695	BR-12490			0	1	2		
3B		Part of R-f Line Tuner	BUSHING: Brass, gold plated, 31/64" diameter, 0.989" long			1		B-17619-4	050		2	2	4		
3B		Part of R-f Line Tuner	PLUG: Brass, Navy Spec. 47B2, gold plated 27/64" diameter, 0.803" long			1		B-17619-3	051		2	2	4		
3B		Beating oscillator probe trap	PROBE TRAP ASSEMBLY: 13/16" diameter, 7/16" long			1		B-17470-1	052		1	1	2		
3B		Part of R-f Line Tuner	SCREW: Phosphor bronze, gold plated, knurled head, 3/8" x 1-7/8" long			1		B-17619-2	053		2	2	4		

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			CRYSTALS												
3B		Holder for Crystal	CRYSTAL HOLDER ASSEMBLY: Approximately 0.74" long, 0.437" diameter, 5/8 - 40 thread			1		B-17469-1	057		1	1	2		
			INSULATORS												
3B		Mounting for Keep-alive Resistor	MOUNTING STRIP: Glass bonded mica, 2-1/2" long, 9/16" wide, 5/16" thick, 2 terminals (BA-10139-4), set in place			1		BO-14414-5 (Omit Item 1 Resistor)	145		1	1	1		
			MISCELLANEOUS												
4			GASKET: Rubber, 1-1/2" long, 1-1/2" wide, 3/16" diameter hole, 1/4" thick			1		ES-682406-1	025		1	2	4		
4			GASKET: Synthetic rubber Navy Spec. 33R1, Class 2, 1-1/4" diameter, 3/8" diameter hole						026					4 2	
			MISCELLANEOUS												
5		Bearing for Wave Guide Rotary Joint	BALL BEARING: Single row, metric type, radial bearing, 4.7244" bore, 7.0866 O.D., 1.1024" width			43	3L24		001		0	1	1		
5		Seal for Wave Guide Sliding Joint	GASKET: Felt, 3/4" x 1-1/2" OD, 15/32" x 31/32" I.D., 1/8" thick			1		BA-18477	015		2	4	8		
5		Seal for top of Wave Guide	GASKET: Neoprene, 1-3/4" O.D., 1-3/8" I.D., 3/8" thick			1		BA-18450	016		1	2	4		
5		Wave Guide Choke Flange	GASKET: Neoprene (B.T.L. No. M-162-B per ESA-692037) 1.454" + 0-.005 diameter, 0.105" ± 0.005" thick			1		BO-31756-3	017		9	18	36	5 5A 9	
5		Seal for Wave Guide Rotary Joint Seal for Pump Plunger	GASKET: Oil and Fluid Seal, 1.503" O.D. x 25/64" wide			23 42	No. 50120 No. 287 "Klozure"		027		1	2	4		
5		Seal for Pump Plunger	GASKET: Oil and Fluid Seal, 0.752" O.D. x 1/4" wide			23 42	No. 50364 No. 5 "Klozure"		028		1	2	4		
5		Main Spring for Periscope Adapter	SPRING: Steel wire, capable of extending to 77-5/8" without permanent set, spring tension not more than 200 lbs., hook and stud on ends of 18-8 corr. res. steel			40		BL-18453	036		0	2	4		
5		Seal for Rotary Joint Bearing	RING: Felt, 5-27/32" O.D., 5-3/32" I.D., 3/16" thick			1		BL-16508	039		2	4	8		

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			MISCELLANEOUS (Continued)												
5		For Pump Plunger	WASHER: Plunger, oiled leather, 1" O.D., 23/32" I.D., 1/4" diameter of hole			1		BA-19005	047		2	4	8	5	
5		Drip proof protection for Wave Guide	DISC: Mica, 1-21/32" diameter, 0.010" thick			1		BA-18486	047A		2	4	6	5A	
			MISCELLANEOUS												
5A		Wave Guide Choke Flange	GASKET: Neoprene (B.T.L. - No. M-162-B per ESA-692037) 1.454 + 0-.005 diameter, 0.105" ± 0.005" thick						017					5A 5 9	
5A		Drip proof protection for Wave Guide	DISC: Mica, 1-21/32" diameter, 0.010" thick						047A					5A 5	
5A		Connecting Details for Wave Guide Units	COVER: Brass, 1-7/8" x 1-7/8" x 7/16"	-49474	RE 49F 203	33 48 58	A/N-UG-51/U		233		0	7	14	5A 9	
5A			LOCKNUT: Brg. No. 5, diameter 1-9/16", width 13/32"			61	N-05		237		0	1	2		
5A			LOCK WASHER: Brg. No. 5, 1-9/32" outside diameter, 0.989 inside diameter			61	W-05		238		0	1	2		
5A		For Wave Guide Valve	SPRING: 1" I.D., 2" C.I., 0.062" thick			1		BA-16600			1	1	2		
			MISCELLANEOUS												
7		Seal for cover	GASKET: Corprene - DC-118, approximately 12-5/8" x 9" x 1/32" thick			1		BO-19531	009		1	2	4		
7		Seal for Terminal Box	GASKET: Corprene - DC-118, approximately 3-3/16" x 4-7/8" x 1/32" thick			1		BL-19532	010		1	2	4		
7		Seal for Wave Guide Outlet	GASKET: Corprene - DC-118, approximately 3" diameter, 1/32" thick			1		BA-19533	011		5	10	20	7 10	
			MISCELLANEOUS												
9		Wave Guide Choke Flange	GASKET: Neoprene (B.T.L. - No. M-162-B per ESA-692037) approximately 1.454" +0 -0.005 diameter, 0.105" ± 0.005" thick						017					9 5 5A	
9		Connecting Details for Wave Guide Units	CHOKE FLANGE: Brass, 1-7/8" x 1-7/8" x 5/8"	-49475	RE 49F 203	33 48 58	A/N-UG-52/U		232		0	4	8		

NOTE: THIS TABLE IS FOR REDUCTION TO 9 3/4" WIDE

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			MISCELLANEOUS (Continued)												
9		Connecting Details for Wave Guide Units	COVER: Brass, 1-7/8" x 1-7/8" x 7/16"						233					9 5A	
9		Connecting Details for Wave Guide Units	ELBOW: Cast brass, Navy Spec. 46B23, 90°, radius 1.503" ± 0.005			1		BO-18252	234		0	4	4		
9		Connecting Details for Wave Guide Units	ELBOW: Cast brass, Navy Spec. 46B23, 90°, radius 1.815" ± 0.005			1		BO-18253	235		0	4	4		
9		Connecting Details for Wave Guide Units	FLEXIBLE TUBING ASSEMBLY: Brass with rubber cover, 1' long, 1-3/4" square end			5		BA-413888	236		0	1	1		
			MISCELLANEOUS												
10		Seal for Wave Guide Outlet	GASKET: Corprene - DC-118, approximately 3" diameter, 1/32" thick						011					10 7	
10		Seal for Cover	GASKET: Corprene, DC-118, approximately 12-5/8" long x 7-1/8" wide			1		BO-19563	012		1	2	4		
10		Seal for Terminal Box	GASKET: Corprene, DC-118, approximately 3-3/16" long x 3-1/4" wide			1		BA-19568	013		1	2	4		
10		Seal for Echo Box Jack	GASKET: Corprene, DC-118, approximately 1" long x 1" wide, 0.15" thick			1		BA-19580	140		1	2	4		
			CABLE, WIRE												
10		Echo Box Output	CABLE ASSEMBLY: 5-3/4" RG-9-V Coaxial Jack J2, Unit 10, D-163475 (-49206) at one end and Plug D-163469 (-49205) P2, Unit 10 at other end					BO-19565	154		1	1	2		
			RESISTORS												
10		Power Absorber	RESISTANCE STRIP: Carbon deposit on phenol fibre, 500 ohm/square - 9449P, vc 13193, approximately 3" long, 0.032" thick			27		BA-19581	223		2	4	7		
			MISCELLANEOUS												
11		For F1, F2, F3, F4, Unit 11 and Spares	FUSE CLIP: Spring temper phosphor bronze, Navy Spec. 46B14, 15/16" over-all dimension, approximately 5/8" wide	-28002	RE 28AA 116D	35 49 56		ES-682067-2	006		2	4	16		
11		For Fuses	FUSE PULLER: Midget Size			28			008		1	1	2		

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			MISCELLANEOUS (Continued)												
11		Seal for cover	GASKET: Neoprene, 3/16", 17-9/16" long, 13-1/8" wide, Shore Durometer hardness 40° ± 5°			1		ES-689168-1	018		1	2	4		
11		Seal for special Cable Outlets	GASKET: Synthetic rubber, Navy Spec. 33R1, Class 2, 1-19/32" O.D., 1-7/32" I.D., 1/16" thick, Shore Durometer hardness 40° ± 5°			1		BA-19074	023		2	4	8		
11		Seal for Auxiliary Cover	GASKET: Synthetic rubber, Navy Spec. 33R1, class 2, 6-1/8" x 4-3/8" OD, 5-13/16" x 4-1/16" ID, 3/16" thick, Shore Durometer hardness 40° ± 5°			1			024		1	2	4		
11		Indicator for F1, F2, F3, F4, Unit 11	INDICATOR AND FUSELOCK: 115 volts, 0-30 amperes		17F10(INT)	32	FL-2		038		1	1	4		
			PLUGS, JACKS, CONNECTORS												
11		Special Outlet for Transmitter Cable	CONNECTOR: Conduit box, die cast aluminum, 1-3/8" across flat of nut; 7/8" depth, 1-3/16-18 thread			6	AN-3064-12		120		1	2	2		
11		Lock nut for Connector	LOCK NUT: Conduit coupling, aluminum, 1-3/8" across flat of nut, 1-19/32" across corners, 1-3/16-18 thread			6	AN-3066-12		121		1	2	2		
11		For adapting small cable to J1, J2, J3, J4, Unit 11	ADAPTER: Switching Unit			1		BA-18494	135A		2	3	6		
			INSULATORS												
11		Insulator for High Voltage Terminals	BUSHING: Ceramic, 3/8" long, 9/16" diameter, 11/64" diameter of hole (Female Part II) Amertran Drawing S-42310	-61371		24		ES-682037-2	142		4	8	16		
11		Insulator for High Voltage Terminals	BUSHING: Ceramic, 21/32" long, 9/16" diameter, 11/64" diameter of hole (Male Part I) Amertran Drawing S-42310	-61370		24		ES-682037-12	143		4	8	16		
			MISCELLANEOUS												
13			GASKET: Medium soft rubber, Navy Spec. 33RIE, Class 1, with flat surface, 3/4" diameter, 18-5/8" long			1		BO-17611-1	019		2	4	8		
13			GASKET: Medium soft rubber, Navy Spec. 33RIE, Class 1, with flat surface, 3/4" diameter, 22-1/2" long			1		BO-17611-2	020		2	4	8		
13			SHOCK MOUNT: Steel and rubber, rated 70 lbs., 3" x 3' x 1-1/2", 3/8" bolt			10	C-2070	BA-13458-65	032		3	12	24		

TABLE II (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY			UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
											A	B	C		
			MISCELLANEOUS (Continued)												
13			SHOCK MOUNT: Steel and rubber, rated 70 lbs., 3" x 3' x 1-1/2", 3/8" bolt, has welded section			10	C-2070	BA-13458-98	033		1	4	8		
13			SPRING: Steel music wire 0.055" diameter, Navy Spec. 22W11, zinc plated, approximately 1-5/16" free length, 7/32 pitch 6, active coils			1		BO-18049-7	035		1	2	5		
			MISCELLANEOUS												
ST			OIL: 2 oz. can No. 3 Aviation Form -a-Gasket Liquid			67	No. 3				4	4	8		

FIELD CHANGES - ASSOCIATED MODIFICATION KITS

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	QUANTITY B	QUANTITY C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			KIT - D-152383 (Note 1)												
			RESISTORS												
14A	R40A		RESISTOR: Composition, 10,000 ohms ±10%, 2 watts			64	RC 41BF 103K								
14A	R40B		RESISTOR: Same as R40A, Unit 14A												
14A	R65		RESISTOR: Composition, 0.22 megohm ±20%, 1 watt			64	RC 31BF 224M								
14A	R110		RESISTOR: Composition, 82,000 ohms ±10%, 2 watts			64	RC 41BF 823K								
14A	R111		RESISTOR: Composition, 68,000 ohms ±10%, 2 watts			64	RC 41BF 683K								
14A	R112		RESISTOR: Same as R111, Unit 14A												
14A	R113		RESISTOR: Composition, 4,700 ohms ±20%, 1 watt			64	RC 31BF 472M								
14A	R114		RESISTOR: Composition, 330 ohms ±10%, 1/2 watt			64	RC 31BF 331K								
14A	R115		RESISTOR: Composition, 1 megohm ±20%, 1/2 watt			64	RC 21BF 105M								
14A			POTENTIOMETER: Composition 0.2 megohm, 3" round shaft, 3/8" bushing length	-631147-A20S		66	Series 35	ES-696877-82							
			KIT - D-152315												
			MISCELLANEOUS												
14B	-		TUBE LOCK: Med. octal			11	926-C-5	BA-10178-5							
			VACUUM TUBES												
14B	-		VACUUM TUBE: Beam Power Amplifier			65	6Y6-6								
			KIT - D-152320												
			CAPACITORS												
14C	C226		CAPACITOR: Mica, 470 mmf ±10%, 500 volts d-c working			62	CM20A471K								
			RESISTORS												
14C	R45		RESISTOR: Composition, 3,900 ohms ±10%, 2 watts			64	RC40B392K								
14C	R216		RESISTOR: Composition, 150 ohms ±10%, 1/2 watt			64	RC20B151K								

FIELD CHANGES - ASSOCIATED MODIFICATION KITS (Continued)

A=EQUIPMENT; B=TENDER; C=STOCK

UNIT NO.	SYMBOL DESIG.	FUNCTION	DESCRIPTION	NAVY TYPE NO.	NAVY SPEC. OR DRAWING NO.	MFR.	MANUFACTURER'S DESIGNATION	CONTRACTOR'S DRAWING AND PART NO.	SPARE PARTS						
									ITEM NO.	BOX NO	QUANTITY A	B	C	UNIT NO	ALL SYMBOL DESIGNATIONS INVOLVED
			KIT - D-152326												
			RESISTORS												
14D	R14		RESISTOR: Composition, 0.33 megohm ±10%, 1/2 watt			64	RC 20BE 334K								
14D	R15		RESISTOR: Composition, 56,000 ohms ±10%, 1/2 watt			64	RC 20BE 563K								
14D	R16		RESISTOR: Composition, 6,800 ohms ±10%, 1/2 watt			64	RC 20BF 682K								
14D	P12		POTENTIOMETER: Composition, 0.1 megohm ±10%, 2 watts, 1/2" shaft with screwdriver slot, 3/8" bushing length			4	J	ES-691122-10							

TABLE III

LIST OF MANUFACTURERS

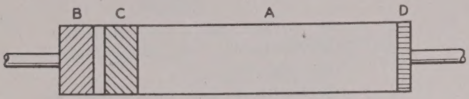
Mfr. Code No.	Navy Mfr. Prefix	Manufacturer	Address
1	CW	Western Electric Co.	New York, New York
2	CCV	Acme Electric & Mfg. Co.	Cuba, New York
3	CAW	Aerovox Wireless Corp.	742 Belleville Ave., New Bedford, Mass.
4	CBZ	Allen Bradley Co.	110 W.Greenfield Ave., Milwaukee 4, Wisc.
5		American Brass Co.	25 Crane St., Waterbury, Conn.
6	CPH	American Phenolic Corp.	1250 W.Van Buren St., Chicago 50, Ill.
7	CMH	American Radio & Hardware Co.	476 Broadway, New York, N.Y.
8	CHH	Arrow-Hart and Hegeman Elec. Co.	103 Hawthorn St., Hartford, Conn.
9	CQA	Astatic Corp.	Youngstown, Ohio
10		L.N. Barry Co.	489 Main St., Cambridge, Mass.
11		The Birtcher Corp.	5087 Huntington Dr., Los Angeles 32, Cal.
12		Bryant Elec. Co.	Bridgeport, Conn.
13		Bulldog Elec. Products Co.	Detroit, Mich.
14	CFA	Bussmann Mfg. Co.	2358 W. University Ave., St. Louis, Mo.
15		Chase Brass & Copper Co.	1939 Rodney St., Waterbury, Conn.
16	CMG	Cinch Mfg. Co.	2339 W. Van Buren St., Chicago, Ill.
17	CD	Cornell Dubilier Corp.	1000 Hamilton Blvd., So. Plainfield, N.J.
18	CAE	Cutler-Hammer, Inc.	1401 W. St. Paul St., Milwaukee, Wisc.
19		Dial Light Co. of America	92 West Street, New York 6, N.Y.
20	CDA	Diehl Manufacturing Co.	Finderne Plant, Somerville, N.J.
21	CEB	Hugh H. Eby	Philadelphia, Pa.
22	CER	Erie Resistor Corp.	644 W. 12th St., Erie, Pa.
23		The Garlock Packing Co.	Palmyra, N.Y.
24	CDP	General Ceramics and Steatite Corp.	Keasbey, N.J.
25	CG	General Electric Co.	1 River Road, Schenectady, N.Y.
26	CHD	Hardwick-Hindle Inc.	65 Johnson St., Newark, N.J.
27	CHP	Haydon Mfg. Co.	Forestville, Conn.
28		Ideal Commutator Dresser Co.	1055 Park Ave., Sycamore, Ill.
29	CIR	International Resistance Co.	401 N. Broad St., Philadelphia 8, Pa.
30	CEJ	E.F. Johnson	Waseca, Minn.
31		Kurz-Kasch	1415 S. Broadway, Dayton, Ohio
32		La Marr Indicating Fuse Corp.	7633 Susquehanna St., Pittsburg, Pa.
33		Lambert Meter Co.	715 W. Front St., Plainfield, N.J.
34	CLF	Littelfuse Laboratories	57 N. Ravenswood Ave., Chicago 40, Ill.
35		L-R Mfg. Co.	Torrington, Conn.
36		The Lunkenheimer Co.	Beekman St. & Waverly Ave., Cincinnati, Ohio
37	CMA	Mallory, P.R. Co. Inc.	1941 Thomas St., Indianapolis, Ind.
38	CMU	Microswitch Corp.	Freeport, Ill.
39	CJA	Jas. Millen Mfg. Co.	Malden, Mass.
40		Miller & Van Winkle Inc.	155 Sherman Ave., Paterson, N.J.
41	CNZ	National Fabricated Products Inc.	2650 W. Belden Ave., Chicago, Ill.
42		National Motor Bearing Co., Inc.	2236 So. Wabash Ave., Chicago, Ill.
43		New Departure Div. of General Motors	1942 Murden St., Bristol, Conn.
44	COC	Oak Mfg. Co.	1200 N. Clybourne Ave., Chicago, Ill.
45	COM	Ohmite Mfg. Co.	4816 W. Flournoy St., Chicago 44, Ill.
46	CAIU	Power Equipment Co.	55 Antoinette St., Detroit 2, Mich.
47	CPB	Price Bros.	Frederick, Md.
48	CSX	Selectar Mfg. Corp.	21-10 49th Ave., L.I.C., N.Y.
49	CSH	The H.B. Sherman Co.	1934 Sperry St., Battle Creek, Mich.
50	CSY	Solar Electric Co.	Chicago 14, Ill.

TABLE III (Continued)

Mfr. Code No.	Navy Mfr. Prefix	Manufacturer	Address
51	CSL	Solar Mfg. Co.	285 Madison Ave., N.Y. 17, N.Y.
52	CSF	Sprague Specialties Corp.	189 Beaver St., No. Adams, Mass.
53	CADF	Standard Transformer Corp.	Chicago, Ill.
54	CSD	Struthers-Dunn, Inc.	1321 Arch St., Philadelphia 7, Pa.
55	CTD	Tobe Deutschman Corp.	Washington Ave., Canton, Mass.
56	CGT	Trumbull Electric Mfg. Co.	1936 Woodford Ave., Plainfield, N.J.
57	CUF	Ucinite (United-Carr Fastener Co.)	Newtonville 60, Mass.
58		The Walworth Co.	60 E. 42nd St., New York, N.Y.
59	CAO	Ward Leonard Co.	6 South St., Mount Vernon, N.Y.
60		Weston Electrical Instrument Co.	639 Frelinghuysen Ave., Newark, N.J.
61		Whittet-Higgins Co.	21 Congress Ave., Providence, R.I.
62		For List of Approved Suppliers of AWS Capacitors See KS-9112	
63		AWS for Milliammeters	
64		For List of Approved Suppliers of AWS Resistors See KS-9460	
65		Vacuum Tubes may be obtained from any Manufacturer having a JAN Approval Certificate for the Particular Type of Tube	
66	CTC	Chicago Telephone Supply Co.	Elkhart, Ind.
67		Permatex Co.	Sheepshead Bay, L. I., N. Y.

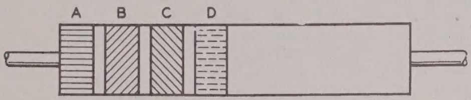
COLOR CODE FOR RESISTORS AND CAPACITORS.

a. SMALL COMPOSITION RESISTORS.—Small composition resistors are color-coded by one of two methods to represent the resistance in ohms.



Resistor Color Code, First Method

(1) The first method is as follows: the first digit of the value of resistance is indicated by the body color (A), the second digit by the tip color (B), and the number of zeros after the second digit by a band or dot (C) painted on the body. A narrow end ring (D), represents the tolerance.



Resistor Color Code, Second Method

(2) The second method is as follows: three narrow rings are painted around the body at one end. The color of the end ring (A), represents the first digit; the second ring (B), the second digit; and the third ring (C), the number of zeros after the second digit. A fourth ring (D) represents the tolerance.

Resistance Values

Black . .	0	Green .	5
Brown .	1	Blue . .	6
Red . .	2	Violet .	7
Orange .	3	Gray . .	8
Yellow .	4	White .	9

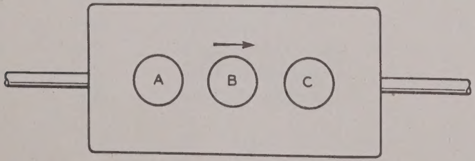
Tolerance

Gold	± 5
Silver . . .	± 10%
No Ring . .	± 20%

Example: 350,000 ohms. First method: body orange, tip green, dot yellow. Second method: orange, green and yellow rings starting at one end.

If the second method were used and the fourth ring were silver, it would denote a tolerance of ± 10 per cent from nominal.

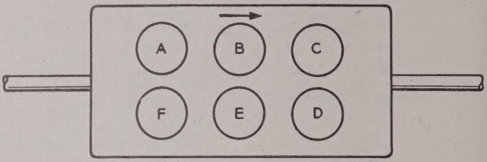
b. MICA CAPACITORS. — Fixed capacitance molded-mica capacitors which are too small to be conveniently marked with capacitance values are color-coded as follows:



Capacitor Three-Dot Color Code

(1) 500-VOLT CAPACITORS.—First colored dot (A), first digit; second colored dot (B), second digit; third colored dot (C), the number of zeros after the second digit. The dots are read in the direction of the arrow; their colors represent the same numbers as listed above for resistors.

Example: 150 micromicrofarads (0.00015 mf) would have a reading from left to right of brown, green, and brown dots; brown standing for one, green for five and brown for one zero, and all three adding up to 150 mmf or 0.00015 mf.



Capacitor Six-Dot Color Code

(2) ALL OTHER VOLTAGE CAPACITORS. —Six markings arranged in two horizontal rows of three each are used. The colors of the dots in the top row (A, B and C), indicate the capacitance; the right-hand lower marking (D), is colored to indicate the decimal multiplier; the intermediate lower marking (E), is colored to indicate the tolerance; and the left-hand lower marking (F), is colored to indicate the voltage rating of the capacitor.

Values for Six-Dot Markings

Color of Dot	*Significant Figure*	*Decimal Multiplier*	*Tolerance*	*Voltage Rating*
Black	0	1	1%	
Brown	1	10	1%	100 volts
Red	2	100	2%	200 volts
Orange	3	1,000	3%	300 volts
Yellow	4	10,000	4%	400 volts
Green	5	100,000	5%	500 volts
Blue	6	1,000,000	6%	600 volts
Violet	7	10,000,000	7%	700 volts
Gray	8	100,000,000	8%	800 volts
White	9	1,000,000,000	9%	900 volts
Gold	—	0.1	5%	1000 volts
Silver	—	0.01	10%	2000 volts
No color	—	—	20%	500 volts

Example: 6,000 micromicrofarads (0.006 mf) would have on the top row reading from left to right, blue, black and black dots, and on the bottom row reading from right to left, brown (for 10 multiplier), silver (for 10 per cent tolerance) and orange to indicate that it is 300 volts. When translated, the top row gives 6 + 0 + 0 = 600, which multiplied by 10 gives 6,000 mmf or 0.006 mf.

SECTION VII

PHOTOGRAPHS AND DRAWINGS

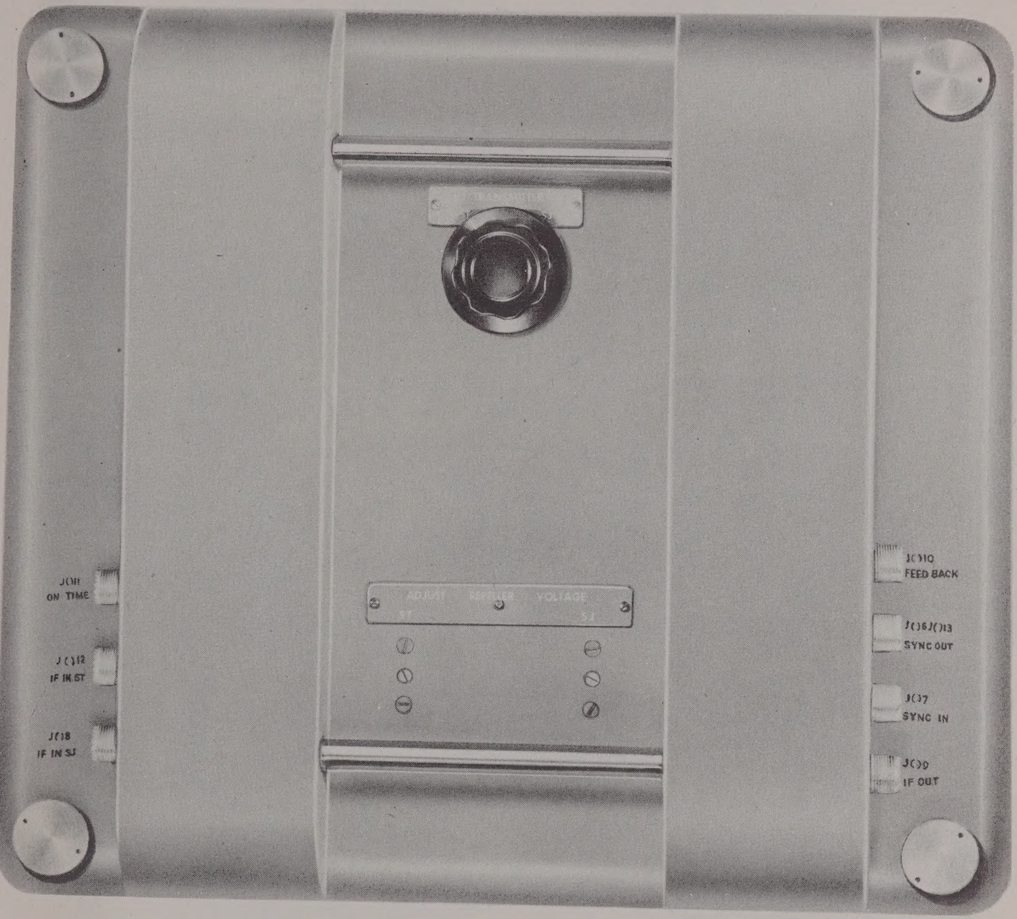

TRANSMITTER
ADJUST REPELLER VOLTAGE
ST
SJ
J()11
ON TIME
J()12
IF IN ST
J()8
IF IN SJ
J()10
FEED BACK
J()6J()13
SYNC OUT
J()7
SYNC IN
J()9
IF OUT

Figure 3—Selector Unit—Front View—125112

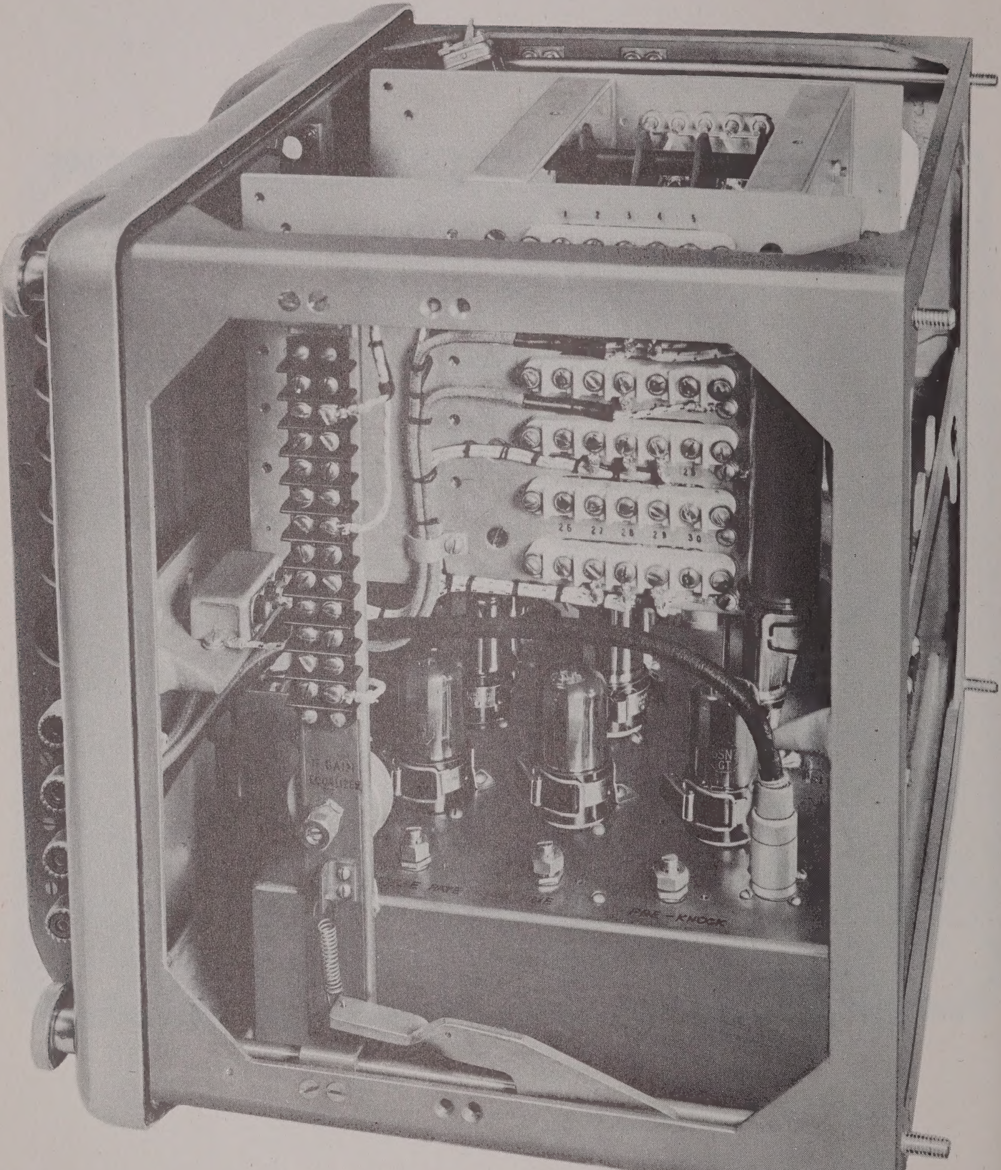

1 2 3 4 5
25 26 27 28 29 30
PRE-KNOCK

Figure 4—Selector Unit—Right Inside View—125110

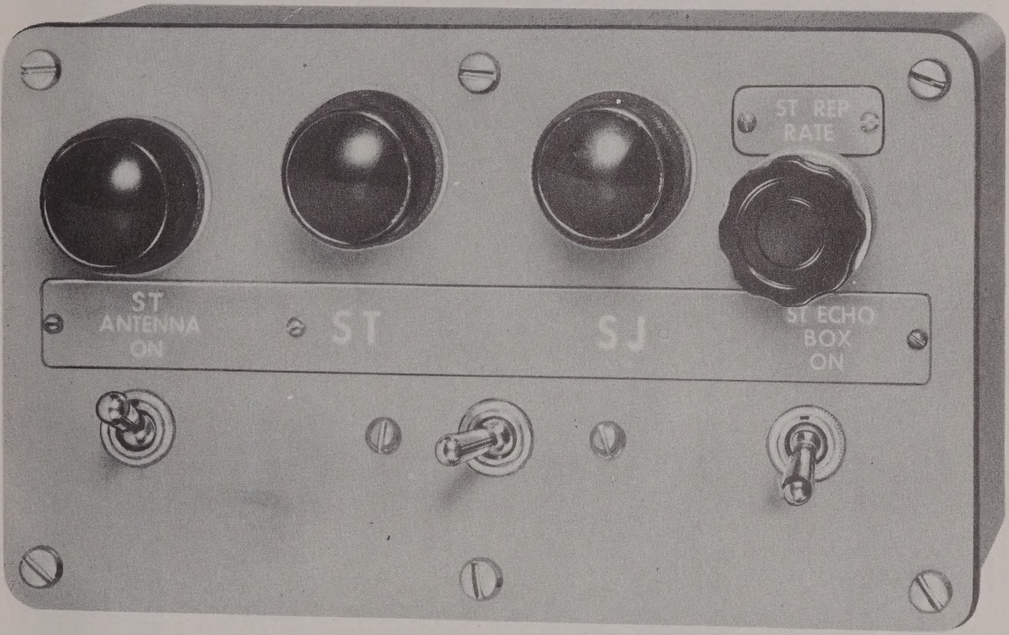

ST REP RATE
ST ANTENNA ON
ST
SJ
ST ECHO BOX ON

Figure 5—Selector Control Unit—125113

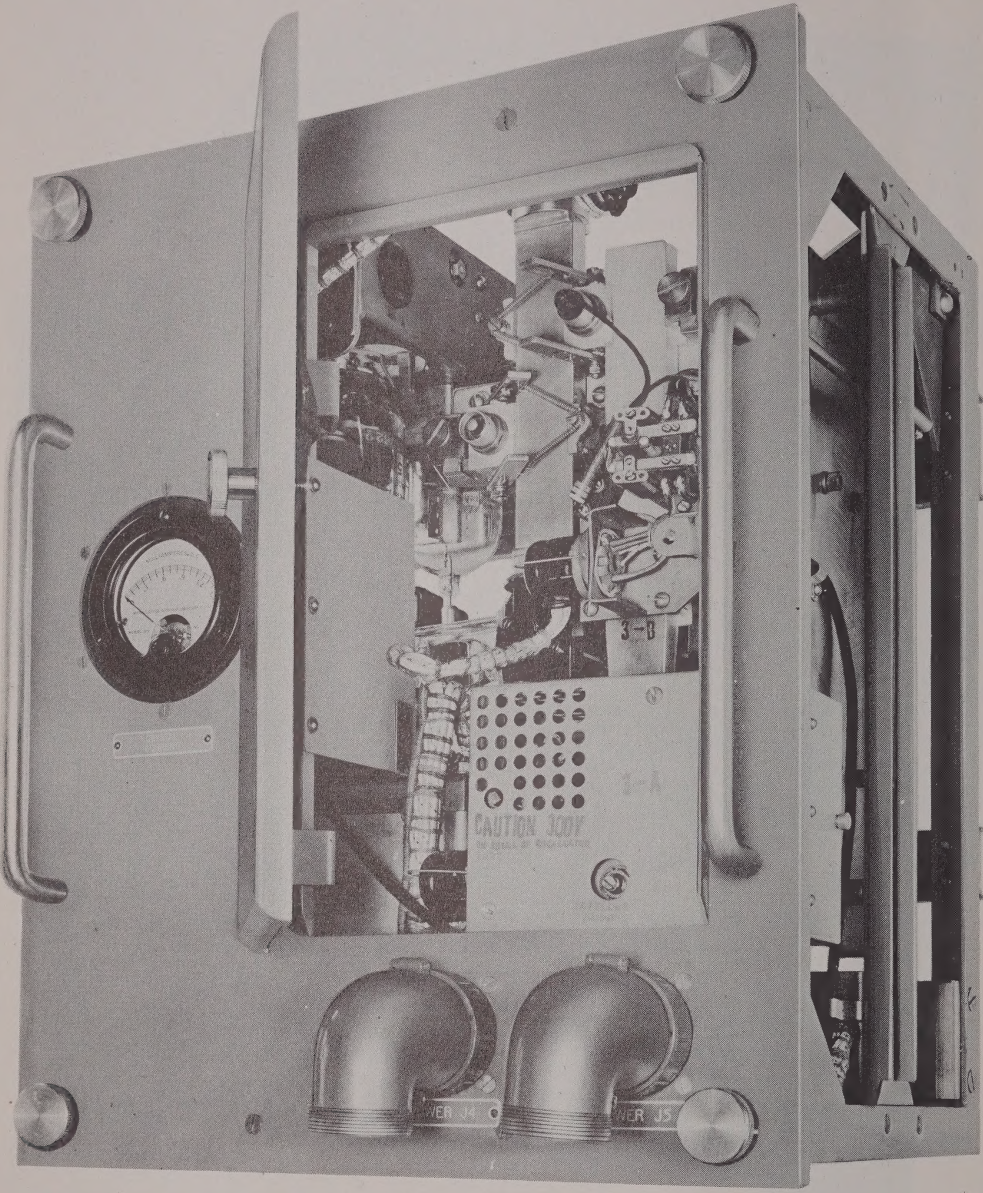

3-B
3-A
CAUTION 300V
WER J4
WER J5

Figure 6—Transmitter-Receiver Unit—Front View, Access Door Open—125107

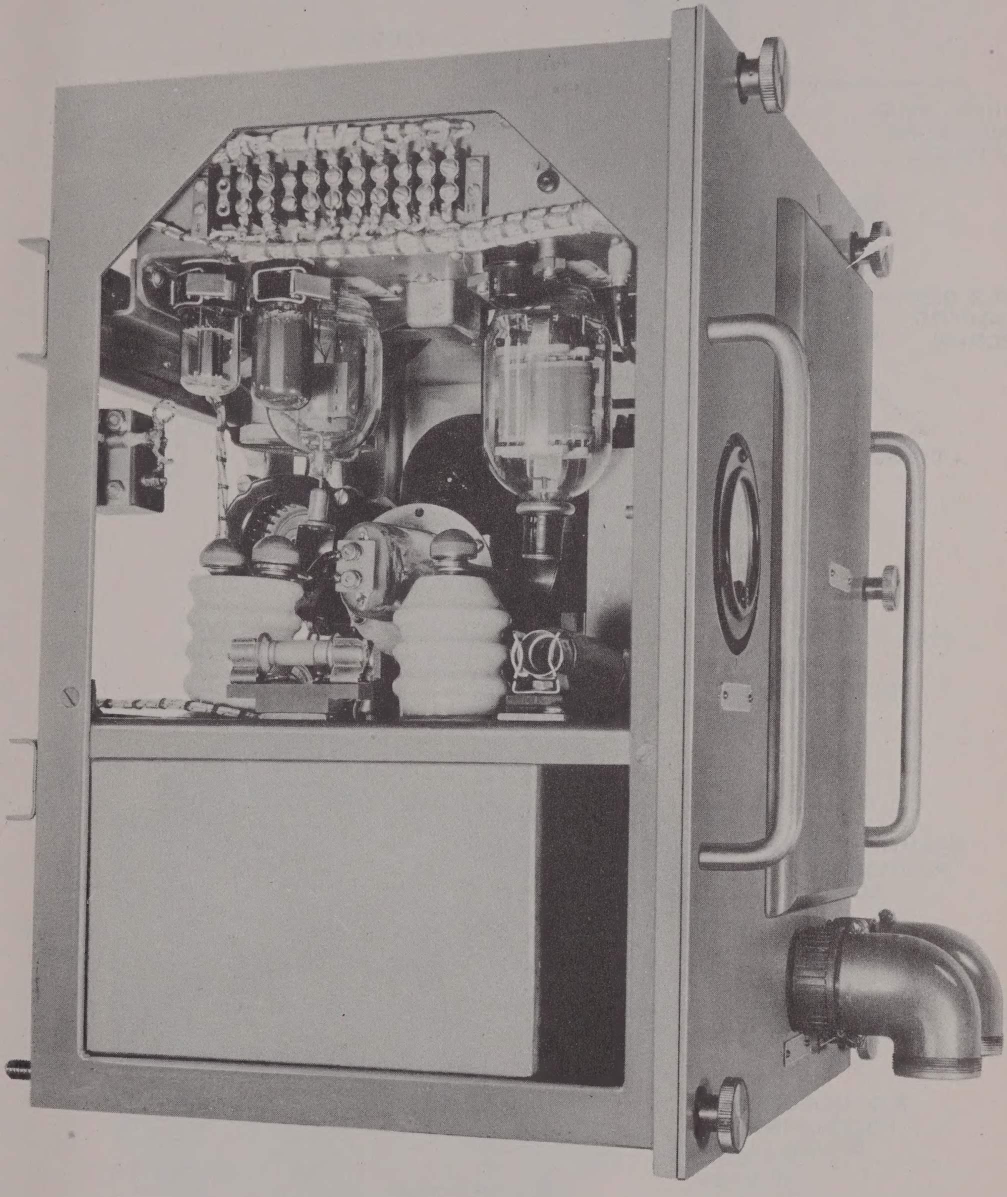


Figure 7—Transmitter-Receiver Unit—Left Inside View—125106

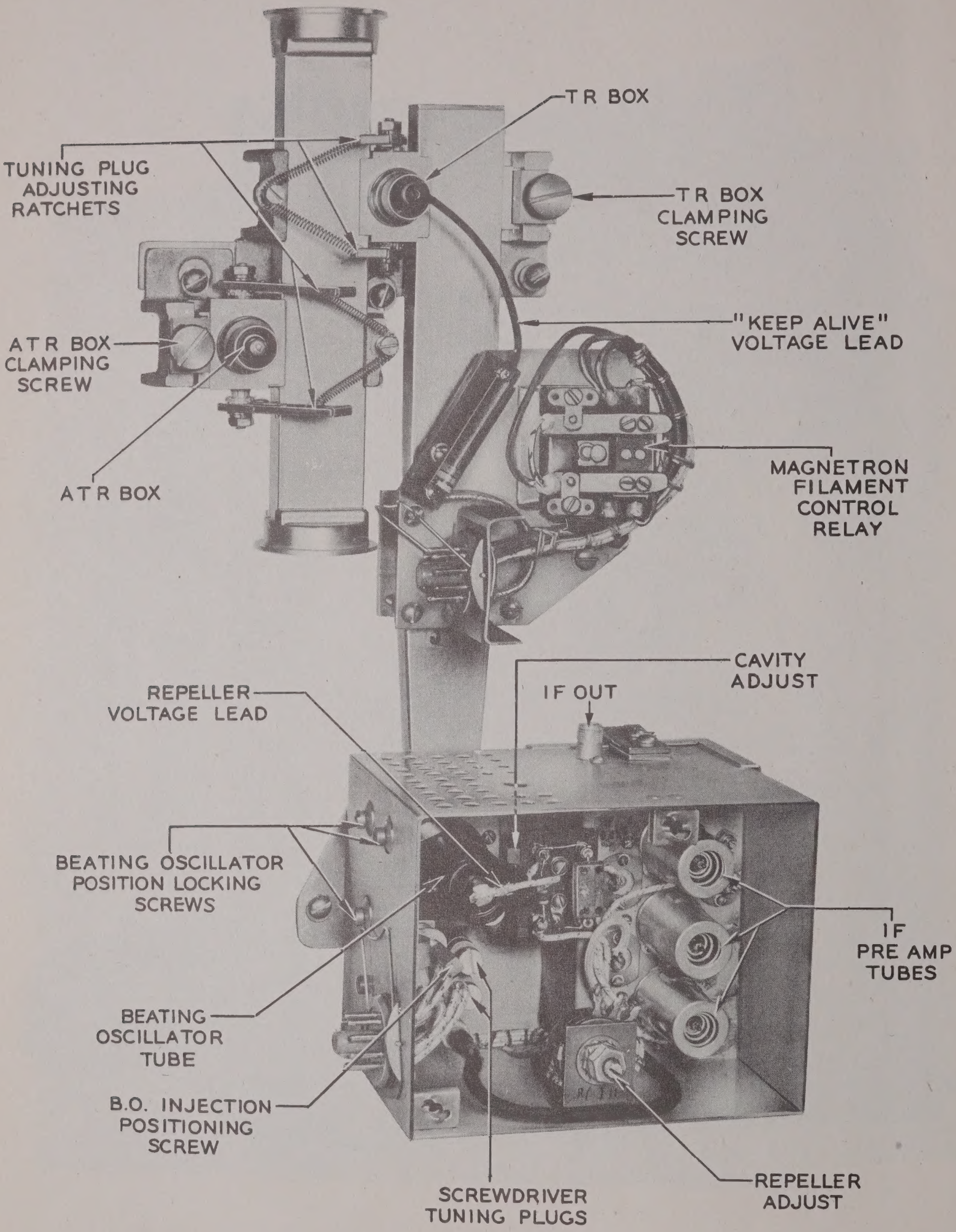

TR BOX
TUNING PLUG ADJUSTING RATCHETS
TR BOX CLAMPING SCREW
"KEEP ALIVE" VOLTAGE LEAD
ATR BOX CLAMPING SCREW
ATR BOX
MAGNETRON FILAMENT CONTROL RELAY
CAVITY ADJUST
IF OUT
REPELLER VOLTAGE LEAD
BEATING OSCILLATOR POSITION LOCKING SCREWS
IF PRE AMP TUBES
BEATING OSCILLATOR TUBE
B.O. INJECTION POSITIONING SCREW
SCREWDRIVER TUNING PLUGS
REPELLER ADJUST

Figure 8—Oscillator Amplifier and RF Line Removed from Transmitter-Receiver Unit—Front View—125109

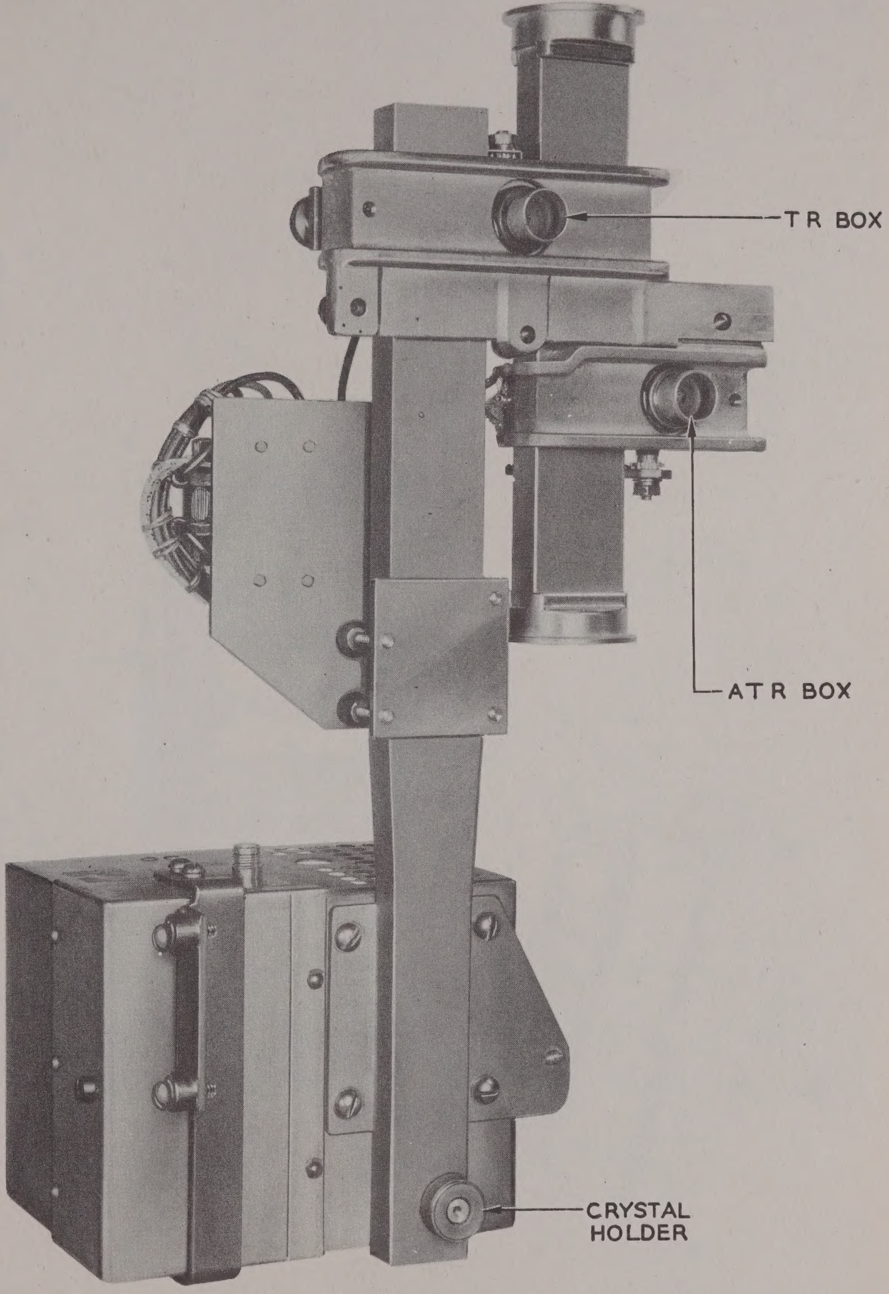

TR BOX
ATR BOX
CRYSTAL HOLDER

Figure 9—Oscillator Amplifier and RF Line Removed from Transmitter-Receiver Unit—Rear View—125108

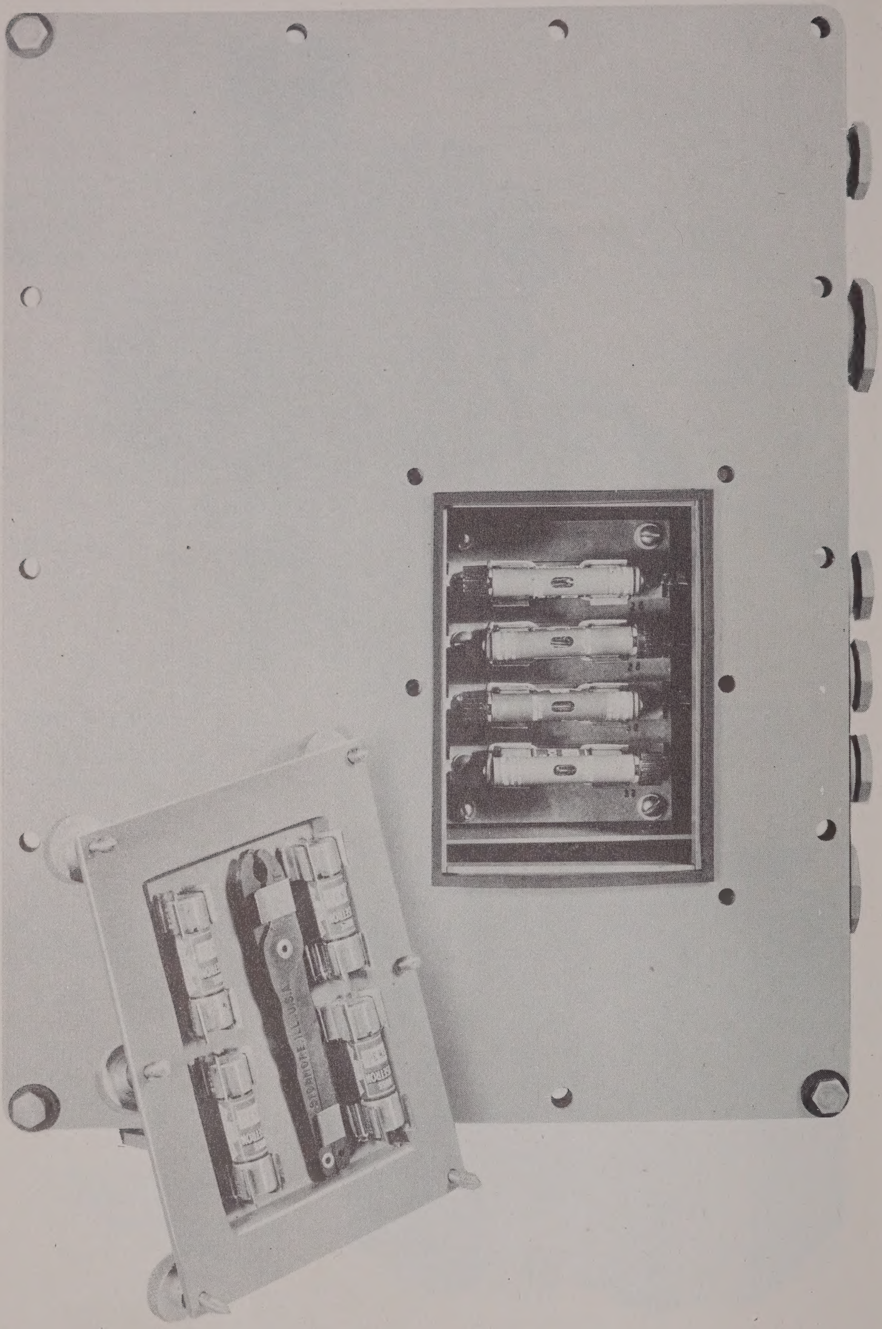
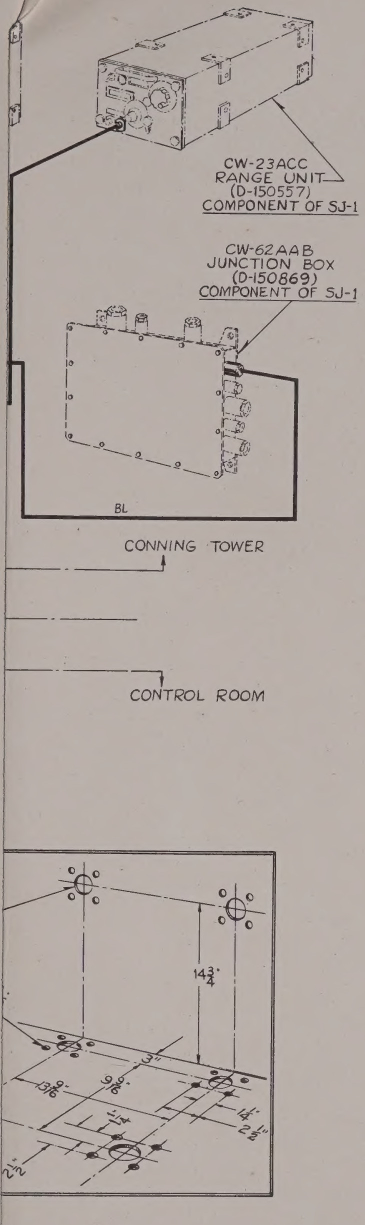


Figure 10—Junction Box with Fuse Access Door Removed—125111



"ST" RADAR EQUIPMENT CONSISTS OF THE FOLLOWING UNITS

REQ	NAVY DESIGNATION	NAME	SUPPLIER'S DES.	UNIT IDEN. NO.
1	SJ/SJ-a; SJ-1 CHANGE 31	SET OF CONVERSION PARTS	D-152315	14B
1	SJ/SJ-a; SJ-1 CHANGE 37	SET OF CONVERSION PARTS	D-152326	14D
1	SJ/SJ-a 35 SJ-1 25	SET OF CONVERSION PARTS	D-152320	14C
1		RADAR TRANSMITTER-RECEIVER	D-152271	3
1		SELECTOR UNIT	D-152272	2
1		PERISCOPE ADAPTER (D-152279) WAVE GUIDE VALVE AND PERISCOPE ADAPTER ECCENTRIC STOP SUPPLIED	D-152273	5 5A
1		SELECTOR CONTROL UNIT	D-152274	4
1	-24AAF	WAVE GUIDE SWITCH	D-152277	7
1		WAVE GUIDE PICK-UP UNIT	D-152280	10
1	-14 AAX	ECHO BOX	D-152349	8
1		MOUNTING FRAME (FOR UNIT 3)	D-152372	13
1		JUNCTION BOX	D-152381	11
1	-66AHT	DUMMY ANTENNA	X-66325A	12
1		SET OF INTERCONNECTING CABLES	D-152276	6
1		MODIFICATION KIT	D-152383	14A
1		WAVE GUIDE COMPLEMENT	D-152275	9

NAVY CABLE DES.	SUPPLIER'S CABLE DESIG.	NAVY TYPE	NO. OF ACTIVE CONDUCTORS
BA	BO-20124-4		7 & 1 COAXIAL
BB	BO-20124-3		10 & 2 COAXIAL
BC		MCOP-7	4
BD		MCOP-4	3
BE	KS-9011		2
BF		MCOP-19	16
BG		MCOS-7	2
BH		RG 13/U	COAXIAL
BI		RG 13/U	COAXIAL
BJ		MCOP-14	10
BK		MCOP-19	13
BL	KS-9011		2
BM	KS-9011		2
BN		MCOS-7	6
BO		RG 13/U	COAXIAL
BP		RG 13/U	COAXIAL
BQ		MCOS-7	4
BR	KS-9011		3
BS		MCOP-19	17
BT		RG 9/U	COAXIAL
BU		RG 9/U	COAXIAL
BV		RG 9/U	COAXIAL
BW		RG 9/U	COAXIAL
BX		RG 13/U	COAXIAL

NOTES

1. *THE PERISCOPE ADAPTER SHALL BE BOLTED AND DOWELED TO THE ADAPTER PLATE ON THE BOTTOM OF THE PERISCOPE SO THAT THE CENTERLINE OF THE PERISCOPE ADAPTER COINCIDES WITH THAT OF THE PERISCOPE WITHIN 1/64 INCH. THE ECCENTRIC STOP SHALL BE INSTALLED DIAMETRICALLY OPPOSITE THE WAVE GUIDE VALVE WITHIN 1/8 INCH VERTICALLY AND 1/4 INCH HORIZONTALLY. THE ALIGNING HOLES ON THE BOTTOM OF THE PERISCOPE ADAPTER MAY BE USED TO LOCATE THE STOP. CUT WAVE GUIDE AND PROTECTING FLANGE ON VALVE TO ALLOW 3/16 INCH GAP BETWEEN MICA DISKS.*
2. *PREPARATORY TO INSTALLATION OF THE "ST" SYSTEM, IT SHALL BE ASCERTAINED THAT ALL REQUIREMENTS ARE MET AS CONTAINED IN THE "ST" INSTRUCTION BOOK, IN SECTION ENTITLED "PREPARATION OF SJ/SJ-a OR SJ-1 SYSTEM FOR ST INSTALLATION."*
3. *ALL CABLES WILL BE FURNISHED BY CONTRACTOR AND WILL BE SUPPLIED IN BULK WITH THE EXCEPTION OF CABLES BA AND BB WHICH ARE SUPPLIED PARTIALLY FABRICATED.*
4. *IF EITHER THE CG-21AAS OR CG-21AAT MOTOR GENERATOR SET IS USED TO SUPPLY POWER FOR THE SJ-1 SYSTEM, THE ADDITIONAL POWER REQUIREMENTS OF THE "ST" SYSTEM MUST BE FURNISHED FROM THE SHIP'S 115 V 60~ SUPPLY THROUGH CABLE AJ OF THE SJ-1 SYSTEM.*

Figure 11—D-152200 Radar Equipment—BXX-19895

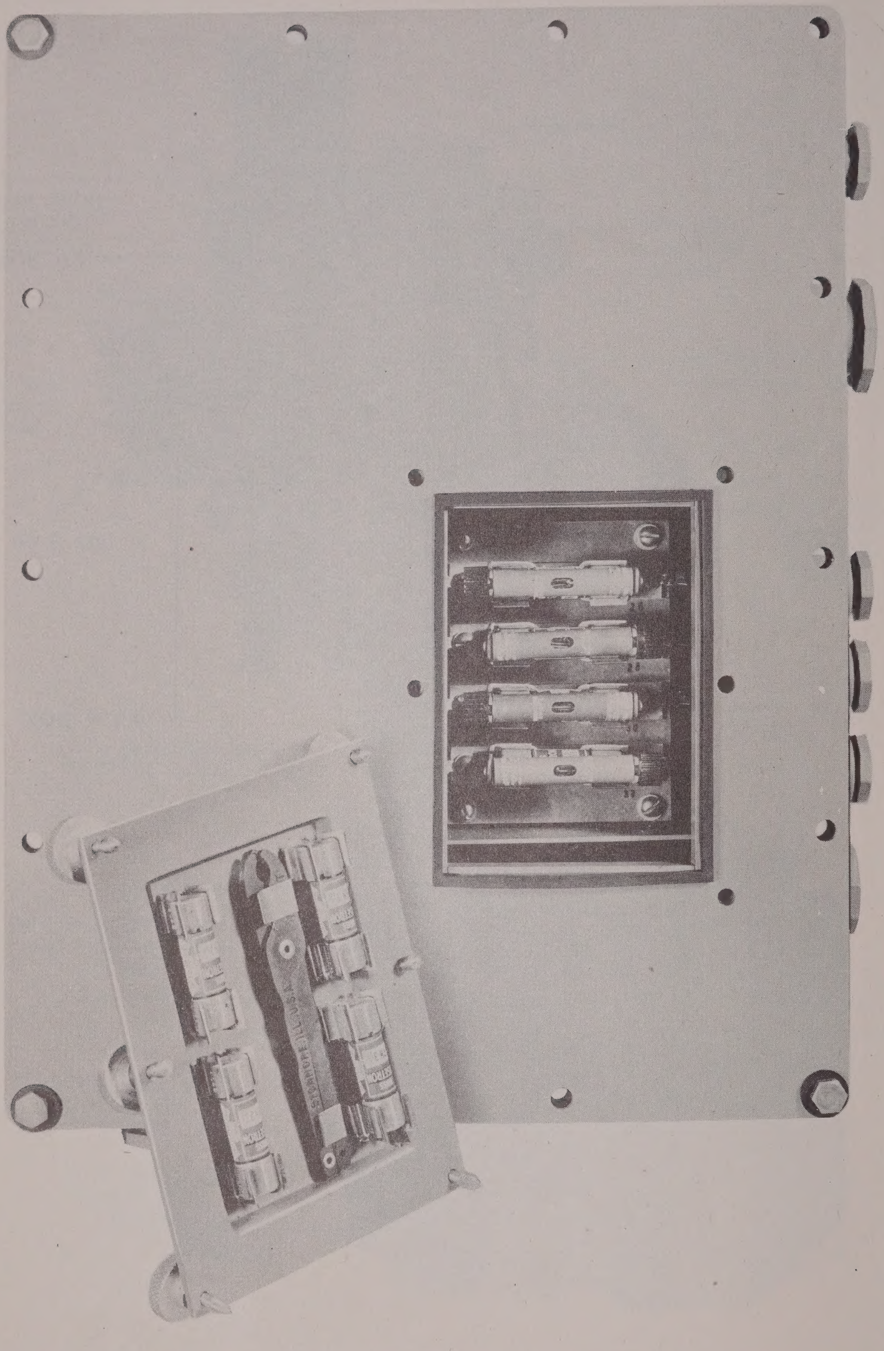
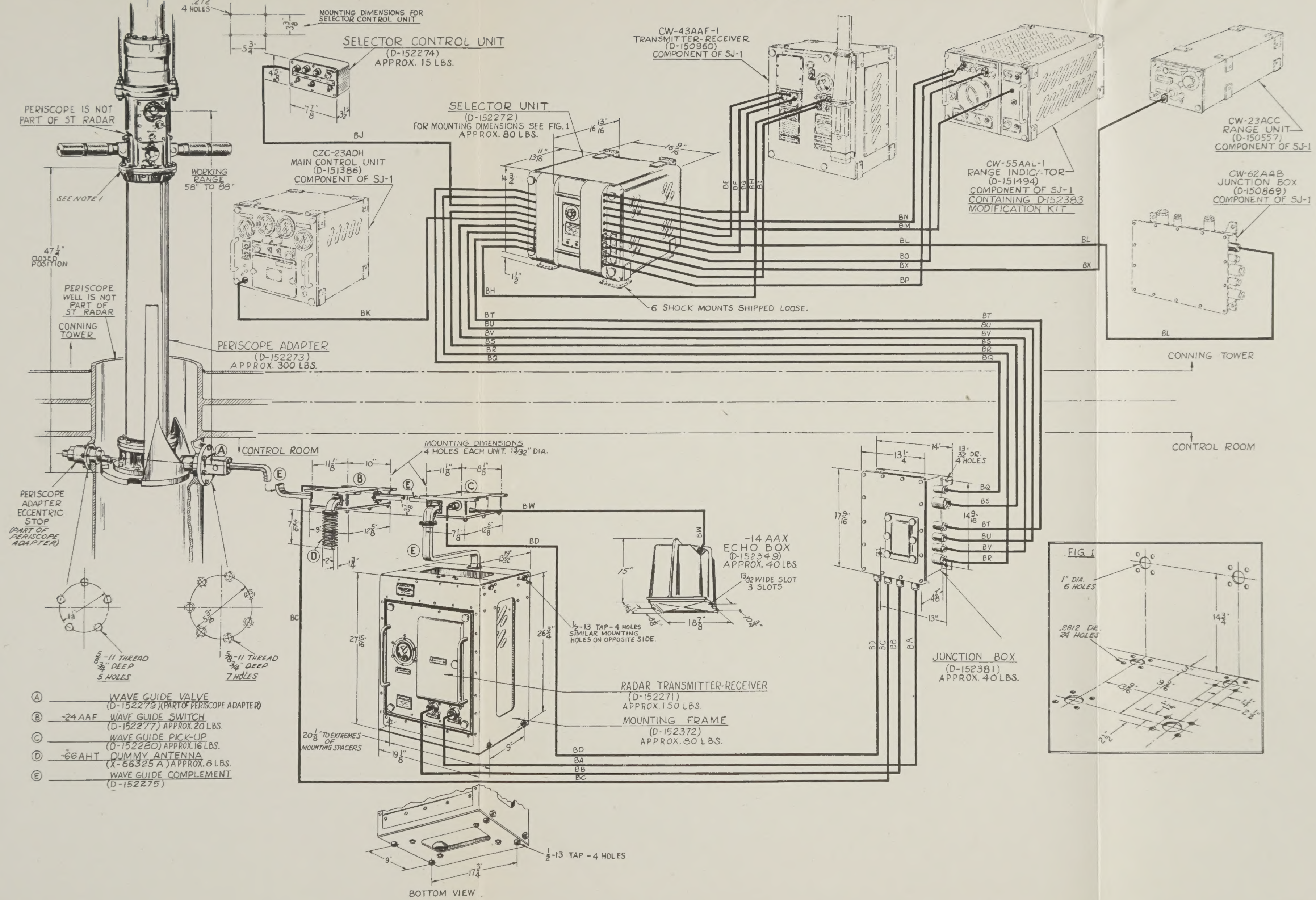


Figure 10—Junction Box with Fuse Access Door Removed—125111


.272
4 HOLES
MOUNTING DIMENSIONS FOR SELECTOR CONTROL UNIT
SELECTOR CONTROL UNIT
(D-152274)
APPROX. 15 LBS.
PERISCOPE IS NOT PART OF ST RADAR
WORKING RANGE 58" TO 88"
SEE NOTE 1
47 1/4" CLOSED POSITION
PERISCOPE WELL IS NOT PART OF ST RADAR
CONNING TOWER
PERISCOPE ADAPTER
(D-152273)
APPROX. 300 LBS.
SELECTOR UNIT
(D-152272)
FOR MOUNTING DIMENSIONS SEE FIG. 1
APPROX. 80 LBS.
CZC-23ADH
MAIN CONTROL UNIT
(D-151386)
COMPONENT OF SJ-1
CW-43AAF-1
TRANSMITTER-RECEIVER
(D-150960)
COMPONENT OF SJ-1
CW-55AAL-1
RANGE INDICATOR
(D-151494)
COMPONENT OF SJ-1
CONTAINING D-152383
MODIFICATION KIT
CW-23ACC
RANGE UNIT
(D-150557)
COMPONENT OF SJ-1
CW-62AAB
JUNCTION BOX
(D-150869)
COMPONENT OF SJ-1
6 SHOCK MOUNTS SHIPPED LOOSE.
BJ BK BH BE BF BG BI BN BM BL BO BX BP BT BU BV BS BR BQ BW BD BA BB BC
CONNING TOWER
CONTROL ROOM
PERISCOPE ADAPTER ECCENTRIC STOP (PART OF PERISCOPE ADAPTER)
MOUNTING DIMENSIONS 4 HOLES EACH UNIT. 13/32" DIA.
5/8-11 THREAD 3/4" DEEP 5 HOLES
5/8-11 THREAD 3/4" DEEP 7 HOLES
Ⓐ WAVE GUIDE VALVE (D-152279) (PART OF PERISCOPE ADAPTER)
Ⓑ -24AAF WAVE GUIDE SWITCH (D-152277) APPROX. 20 LBS.
Ⓒ WAVE GUIDE PICK-UP (D-152280) APPROX. 16 LBS.
Ⓓ -66AHT DUMMY ANTENNA (X-66325 A) APPROX. 8 LBS.
Ⓔ WAVE GUIDE COMPLEMENT (D-152275)
-14 AAX
ECHO BOX
(D-152349)
APPROX. 40 LBS.
13/32 WIDE SLOT 3 SLOTS
1/2-13 TAP-4 HOLES SIMILAR MOUNTING HOLES ON OPPOSITE SIDE.
RADAR TRANSMITTER-RECEIVER
(D-152271)
APPROX. 150 LBS.
MOUNTING FRAME
(D-152372)
APPROX. 80 LBS.
20 1/8" TO EXTREMES OF MOUNTING SPACERS
1/2-13 TAP - 4 HOLES
BOTTOM VIEW
JUNCTION BOX
(D-152381)
APPROX. 40 LBS.
13/32 DR. 4 HOLES
FIG. 1
1" DIA. 6 HOLES
.2812 DR. 24 HOLES

"ST" RADAR EQUIPMENT CONSISTS OF THE FOLLOWING UNITS

REQ	NAVY DESIGNATION	NAME	SUPPLIER'S DES.	UNIT IDEN. NO.
1	SJ/SJ-a; SJ-1 CHANGE 31	SET OF CONVERSION PARTS	D-152315	14B
1	SJ/SJ-a; SJ-1 CHANGE 37	SET OF CONVERSION PARTS	D-152326	14D
1	SJ/SJ-a 35 SJ-1 25	SET OF CONVERSION PARTS	D-152320	14C
1		RADAR TRANSMITTER-RECEIVER	D-152271	3
1		SELECTOR UNIT	D-152272	2
1		PERISCOPE ADAPTER (D-152279) WAVE GUIDE VALVE AND PERISCOPE ADAPTER ECCENTRIC STOP SUPPLIED	D-152273	5 5A
1		SELECTOR CONTROL UNIT	D-152274	4
1	-24AAF	WAVE GUIDE SWITCH	D-152277	7
1		WAVE GUIDE PICK-UP UNIT	D-152280	10
1	-14 AAX	ECHO BOX	D-152349	8
1		MOUNTING FRAME (FOR UNIT 3)	D-152372	13
1		JUNCTION BOX	D-152381	11
1	-66AHT	DUMMY ANTENNA	X-66325A	12
1		SET OF INTERCONNECTING CABLES	D-152276	6
1		MODIFICATION KIT	D-152383	14A
1		WAVE GUIDE COMPLEMENT	D-152275	9

NAVY CABLE DES.	SUPPLIER'S CABLE DESIG.	NAVY TYPE	NO. OF ACTIVE CONDUCTORS
BA	BO-20124-4		7 & 1 COAXIAL
BB	BO-20124-3		10 & 2 COAXIAL
BC		MCOP-7	4
BD		MCOP-4	3
BE	KS-9011		2
BF		MCOP-19	16
BG		MCOS-7	2
BH		RG 13/U	COAXIAL
BI		RG 13/U	COAXIAL
BJ		MCOP-14	10
BK		MCOP-19	13
BL	KS-9011		2
BM	KS-9011		2
BN		MCOS-7	6
BO		RG 13/U	COAXIAL
BP		RG 13/U	COAXIAL
BQ		MCOS-7	4
BR	KS-9011		3
BS		MCOP-19	17
BT		RG 9/U	COAXIAL
BU		RG 9/U	COAXIAL
BV		RG 9/U	COAXIAL
BW		RG 9/U	COAXIAL
BX		RG 13/U	COAXIAL

NOTES

1. *THE PERISCOPE ADAPTER SHALL BE BOLTED AND DOWELED TO THE ADAPTER PLATE ON THE BOTTOM OF THE PERISCOPE SO THAT THE CENTER LINE OF THE PERISCOPE ADAPTER COINCIDES WITH THAT OF THE PERISCOPE WITHIN 1/64 INCH. THE ECCENTRIC STOP SHALL BE INSTALLED DIAMETRICALLY OPPOSITE THE WAVE GUIDE VALVE WITHIN 1/8 INCH VERTICALLY AND 1/4 INCH HORIZONTALLY. THE ALIGNING HOLES ON THE BOTTOM OF THE PERISCOPE ADAPTER MAY BE USED TO LOCATE THE STOP. CUT WAVE GUIDE AND PROTECTING FLANGE ON VALVE TO ALLOW 3/16 INCH GAP BETWEEN MICA DISKS.*
2. *PREPARATORY TO INSTALLATION OF THE "ST" SYSTEM, IT SHALL BE ASCERTAINED THAT ALL REQUIREMENTS ARE MET AS CONTAINED IN THE "ST" INSTRUCTION BOOK, IN SECTION ENTITLED "PREPARATION OF SJ/SJ-a OR SJ-1 SYSTEM FOR ST INSTALLATION."*
3. *ALL CABLES WILL BE FURNISHED BY CONTRACTOR AND WILL BE SUPPLIED IN BULK WITH THE EXCEPTION OF CABLES BA AND BB WHICH ARE SUPPLIED PARTIALLY FABRICATED.*
4. *IF EITHER THE CG-21AAS OR CG-21AAT MOTOR GENERATOR SET IS USED TO SUPPLY POWER FOR THE SJ-1 SYSTEM, THE ADDITIONAL POWER REQUIREMENTS OF THE "ST" SYSTEM MUST BE FURNISHED FROM THE SHIP'S 115 V 60~ SUPPLY THROUGH CABLE AJ OF THE SJ-1 SYSTEM.*

Figure 11—D-152200 Radar Equipment—BXX-19895

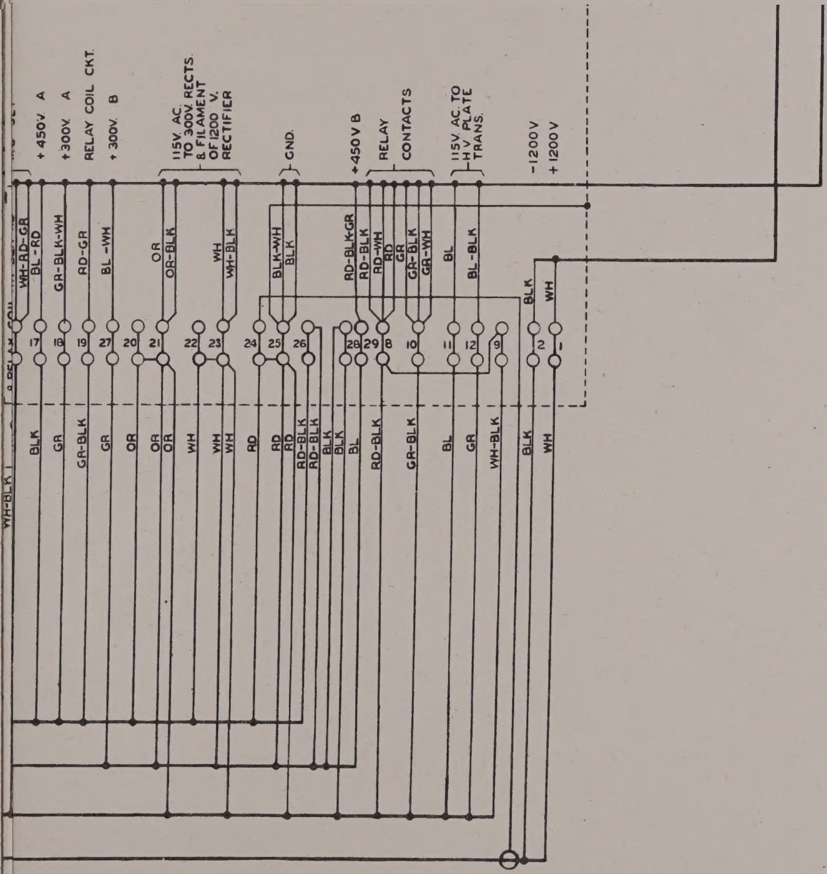

WH-BLK
WH-RD-GR
BL-RD
GR-BLK-WH
RD-GR
BL-WH
OR
OR-BLK
WH
WH-BLK
BLK-WH
BLK
RD-BLK-GR
RD-BLK
RD-WH
RD
GR
GR-BLK
GR-WH
BL
BL-BLK
BLK
WH
+450V. A
+300V. A
RELAY COIL CKT.
+300V. B
115V. AC. TO 300V. RECTS. & FILAMENT OF 1200 V. RECTIFIER
GND.
+450V B
RELAY CONTACTS
115V. AC. TO H V PLATE TRANS.
-1200V
+1200V
17
18
19
27
20
21
22
23
24
25
26
28
29
8
10
11
12
9
2
1
BLK
GR
GR-BLK
GR
OR
OR
OR
WH
WH
WH
RD
RD
RD
RD-BLK
RD-BLK
BLK
BLK
BL
RD-BLK
GR-BLK
BL
GR
WH-BLK
BLK
WH

Figure 12—Cable Interconnections—BXX–20932

CONFIDENTIAL

NOTES:

1. FOR 120 V DC. SUPPLY THE TOTAL RESISTANCE OF LOOP FROM THE MOTOR GENERATOR UNIT SET TO BATTERY, INCLUDING CABLES W AND XI SHOULD NOT EXCEED 1/16 OHM. FOR 250 V DC. SUPPLY RESISTANCE SHOULD NOT EXCEED 1/4 OHM.

2. CABLE PI TO BE COVERED WITH SUITABLE COPPER BRAID BY INSTALLING PARTIES AT TIME OF INSTALLATION.

3. CABLE AB SHALL BE USED TO GROUND TO THE METAL STRUCTURE OF THE SHIP THE GROUND CIRCUIT OF THE CW-62AAB JUNCTION BOX.

4. IF EITHER THE CG-21AAS OR CG-21AAT MOTOR GENERATOR SET IS USED TO SUPPLY POWER FOR THE SJ-1 SYSTEM, THE ADDITIONAL POWER REQUIRMENTS OF THE ST SYSTEM MUST BE FURNISHED FROM THE SHIPS 115V 60~ SUPPLY THROUGH CABLE AJ OF THE SJ-1 SYSTEM. IF IN SOME INSTALLATIONS THE ABOVE MG SET IS NOT USED AND A COMMON SOURCE OF A.C. POWER OF SUFFICIENT CAPACITY FOR THE SJ-1 AND ST RADARS IS PROVIDED, DO NOT USE CABLE AJ OR TERMINALS 10,11,15 AND 16 IN THE D-150960 TRANSMITTER-RECEIVER. REMOVE OR-BLK AND GN-BLK WIRES IN CABLE BF FROM D-152272 SELECTOR UNIT TERMINALS 100 & 101, RESPECTIVELY & STRAP TERMINALS 81 & 82 TO TERMINALS 100 & 101, RESPECTIVELY.

5. WHEN THE ST SYSTEM IS INSTALLED SUBSEQUENT TO THE INSTALLATION OF AN SJ SYSTEM, CABLES I, FI, F2, F3, H&L OF THE SJ SYSTEM MUST BE CHANGED AND THE AFFECTED UNITS RE-CABLED IN ACCORDANCE WITH THIS DRAWING.

6. COAXIAL CABLES ENTERING THE D-152272 SELECTOR UNIT AND THE D-152381 JUNCTION BOX FROM SELECTOR UNIT SHALL TERMINATE IN THE NAVY TYPE C-49195 PLUG ASSEMBLED TO THE NAVY TYPE C-49194 JACK MOUNTED ON THE UNIT. FINISH END AND ATTACH PLUG PER BA-10128, FIG. 54.

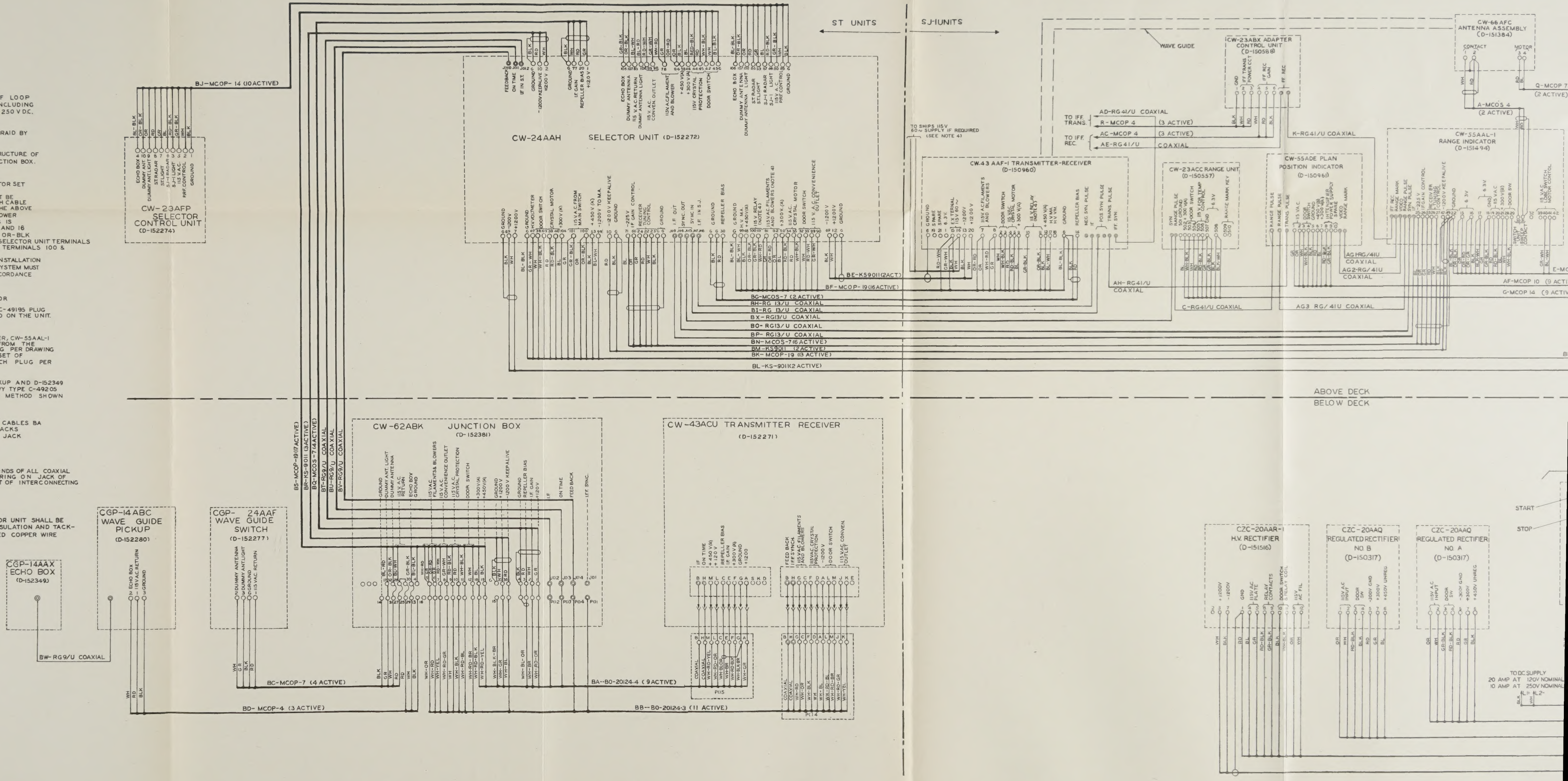
7. COAXIAL CABLES ENTERING CW-43AAF-1 TRANSMITTER, CW-55AAL-1 RANGE INDICATOR AND THE CW-23AAC RANGE UNIT FROM THE D-152272 SELECTOR UNIT SHALL TERMINATE IN A PLUG PER DRAWING BA-10167-3, FURNISHED AS A PART OF THE D-152276 SET OF INTERCONNECTING CABLES. FINISH CABLE END AND ATTACH PLUG PER BA-10128, FIG. 55.

8. COAXIAL CABLE BETWEEN D-152280 WAVE GUIDE PICKUP AND D-152349 ECHO BOX SHALL TERMINATE AT BOTH ENDS IN A NAVY TYPE C-49205 PLUG. FINISH CABLE END AND ATTACH PLUG PER THE METHOD SHOWN ON BUREAU OF SHIPS DRAWING RE-49F180.

9. COAXIAL CABLES ENTERING THE JUNCTION BOX IN CABLES BA AND BB SHALL BE TERMINATED IN THE C-49194 JACKS IN THE UNIT. FINISH CABLE END AND ATTACH JACK PER DRAWING BO-19436, FIG. 3.

10. IDENTIFICATION BANDS SHALL BE ATTACHED TO BOTH ENDS OF ALL COAXIAL CABLES AND SHALL AGREE WITH DESIGNATION APPEARING ON JACK OF UNIT. BANDS ARE SUPPLIED WITH THE D-152276 SET OF INTERCONNECTING CABLES.

11. SHIELDED CABLES ENTERING THE D-152272 SELECTOR UNIT SHALL BE PREPARED BY STRIPPING ONE INCH OF THE OUTER INSULATION AND TACK-SOLDERING A SERVING OF NO. 20 OR 22 AWG TINNED COPPER WIRE OVER THE EXPOSED WIRE BRAID.


ST UNITS
SJ-1 UNITS
CW-24AAH SELECTOR UNIT (D-152272)
CW-23AFP SELECTOR CONTROL UNIT (D-152274)
BJ-MCOP-14 (10 ACTIVE)
CW-43AAF-1 TRANSMITTER-RECEIVER (D-150960)
CW-23ABX ADAPTER CONTROL UNIT (D-150568)
CW-66AFC ANTENNA ASSEMBLY (D-151384)
WAVE GUIDE
TO IFF TRANS.
TO IFF REC.
AD-RG41/U COAXIAL
R-MCOP 4 (3 ACTIVE)
AC-MCOP 4 (3 ACTIVE)
AE-RG41/U COAXIAL
TO SHIPS 115V 60~ SUPPLY IF REQUIRED (SEE NOTE 4)
K-RG41/U COAXIAL
A-MCOS 4 (2 ACTIVE)
Q-MCOP 7 (2 ACTIVE)
CW-23ACC RANGE UNIT (D-150557)
CW-55ADE PLAN POSITION INDICATOR (D-150961)
CW-55AAL-1 RANGE INDICATOR (D-151494)
BE-KS9011 (2ACT.)
BF-MCOP-19 (16 ACTIVE)
AH-RG41/U COAXIAL
C-RG41/U COAXIAL
AG3 RG/41U COAXIAL
AG1 RG/41U COAXIAL
AG2-RG/41U COAXIAL
E-MC
AF-MCOP 10 (9 ACTIVE)
G-MCOP 14 (9 ACTIVE)
BG-MCOS-7 (2 ACTIVE)
BH-RG 13/U COAXIAL
BI-RG 13/U COAXIAL
BX-RG13/U COAXIAL
BO-RG13/U COAXIAL
BP-RG13/U COAXIAL
BN-MCOS-7 (6 ACTIVE)
BM-KS9011 (2ACTIVE)
BK-MCOP-19 (13 ACTIVE)
BL-KS-9011 (2 ACTIVE)
ABOVE DECK
BELOW DECK
BS-MCOP-19 (17 ACTIVE)
BR-KS-9011 (3 ACTIVE)
BQ-MCOS-7 (4 ACTIVE)
BT-RG9/U COAXIAL
BU-RG9/U COAXIAL
BV-RG9/U COAXIAL
CW-62ABK JUNCTION BOX (D-152381)
CW-43ACU TRANSMITTER RECEIVER (D-152271)
CGP-14ABC WAVE GUIDE PICKUP (D-152280)
CGP-24AAF WAVE GUIDE SWITCH (D-152277)
CGP-14AAX ECHO BOX (D-152349)
BW-RG9/U COAXIAL
BC-MCOP-7 (4 ACTIVE)
BA-BO-20124-4 (9 ACTIVE)
BD-MCOP-4 (3 ACTIVE)
BB-BO-20124-3 (11 ACTIVE)
P15
P14
CZC-20AAR-1 H.V. RECTIFIER (D-151516)
CZC-20AAQ REGULATED RECTIFIER NO. B (D-150317)
CZC-20AAQ REGULATED RECTIFIER NO. A (D-150317)
START
STOP
TO DC SUPPLY 20 AMP AT 120V NOMINAL 10 AMP AT 250V NOMINAL

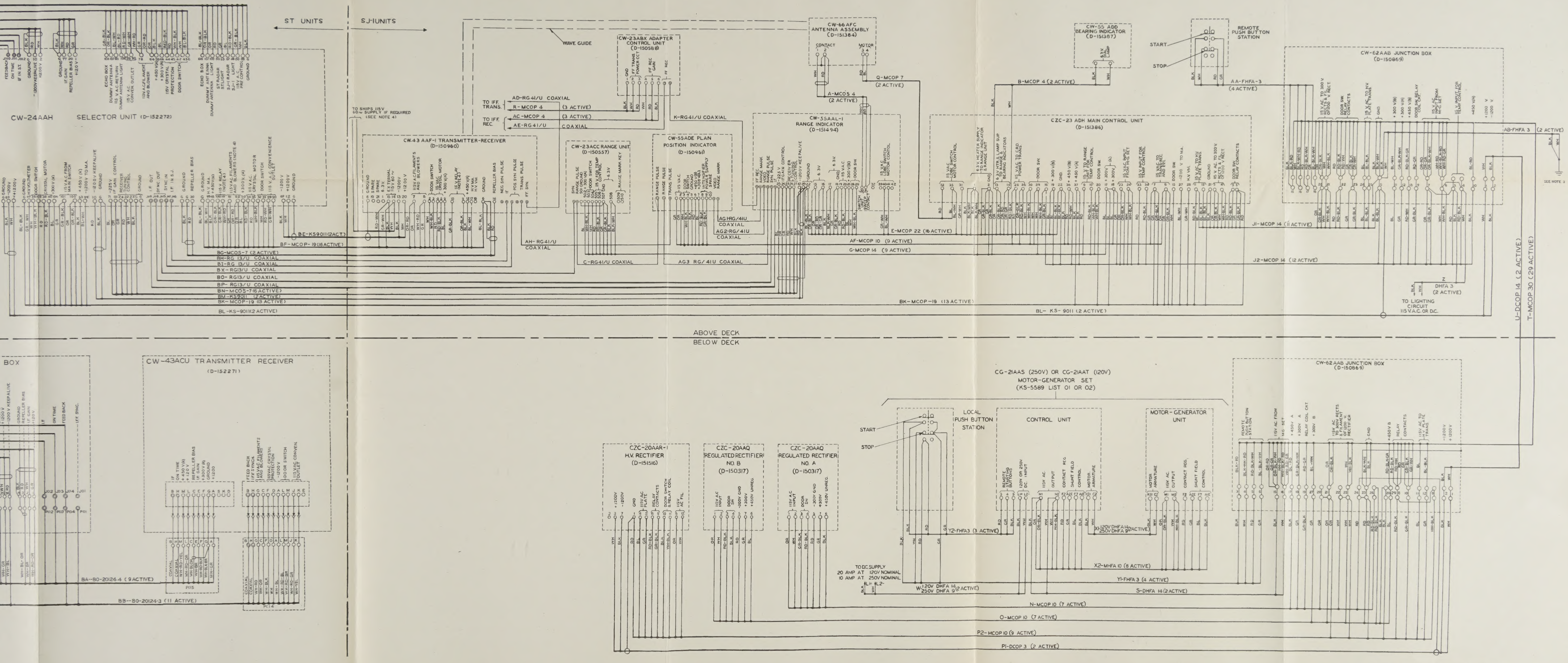
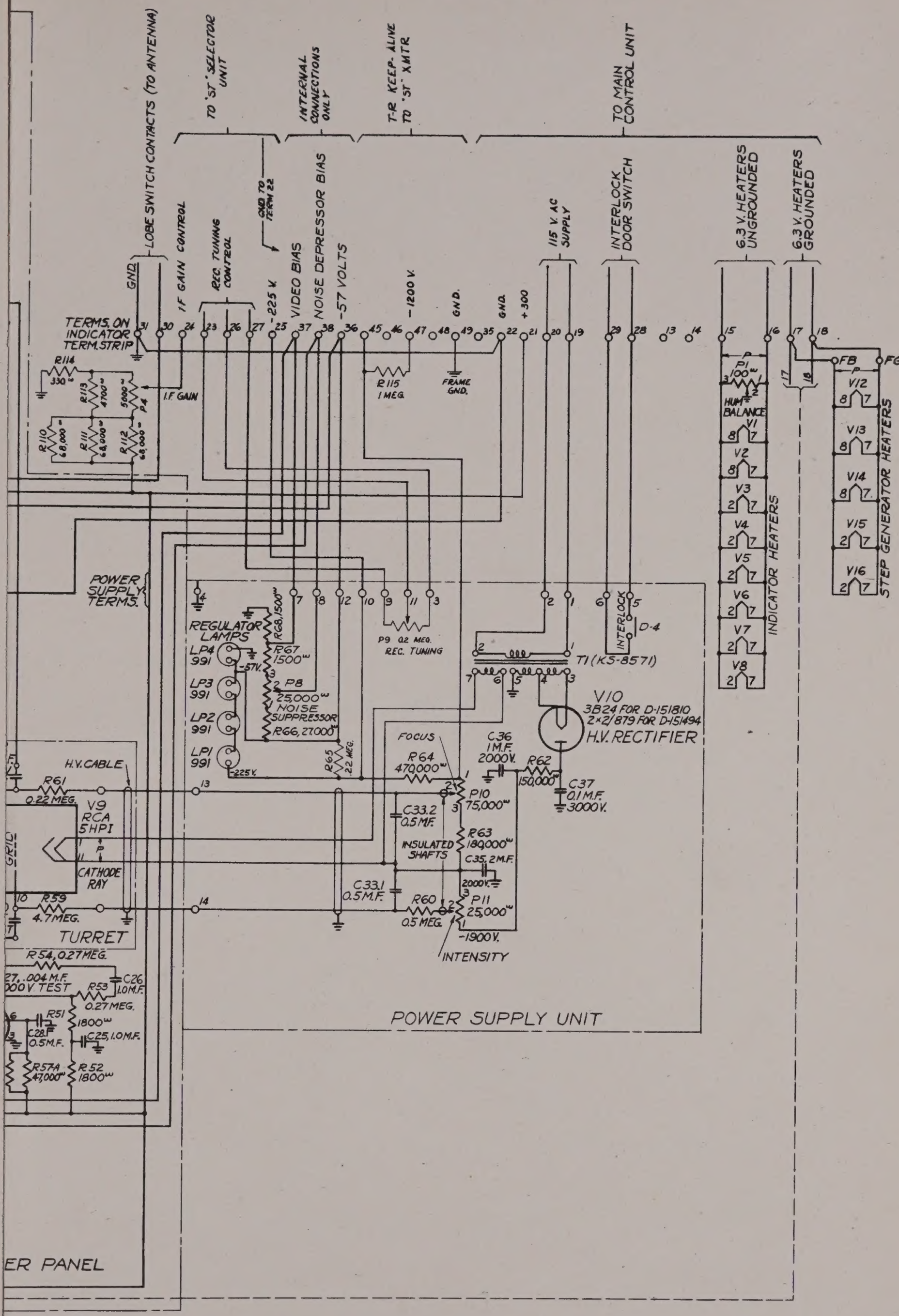

ST UNITS
SJ-1 UNITS
CW-24AAH SELECTOR UNIT (D-152272)
WAVE GUIDE
CW-23ABX ADAPTER CONTROL UNIT (D-150588)
CW-66AFC ANTENNA ASSEMBLY (D-151384)
CONTACT
MOTOR
CW-55ADD BEARING INDICATOR (D-151387)
REMOTE PUSH BUTTON STATION
START
STOP
CW-62AAB JUNCTION BOX (D-150869)
Q-MCOP 7 (2 ACTIVE)
A-MCOS 4 (2 ACTIVE)
B-MCOP 4 (2 ACTIVE)
AA-FHFA-3 (4 ACTIVE)
AB-FHFA 3 (2 ACTIVE)
SEE NOTE 3
TO SHIPS 115V 60~ SUPPLY IF REQUIRED (SEE NOTE 4)
TO IFF TRANS.
TO IFF REC.
AD-RG41/U COAXIAL
R-MCOP 4 (3 ACTIVE)
AC-MCOP 4 (3 ACTIVE)
AE-RG41/U COAXIAL
K-RG41/U COAXIAL
CW-43AAF-1 TRANSMITTER-RECEIVER (D-150960)
CW-23ACC RANGE UNIT (D-150557)
CW-55ADE PLAN POSITION INDICATOR (D-150961)
CW-55AAL-1 RANGE INDICATOR (D-151494)
CZC-23ADH MAIN CONTROL UNIT (D-151386)
AG1-RG/41U COAXIAL
AG2-RG/41U COAXIAL
E-MCOP 22 (16 ACTIVE)
AF-MCOP 10 (9 ACTIVE)
G-MCOP 14 (9 ACTIVE)
J1-MCOP 14 (11 ACTIVE)
J2-MCOP 14 (12 ACTIVE)
BE-KS5901I (2ACT.)
BF-MCOP-19 (16ACTIVE)
AH-RG41/U COAXIAL
BG-MCOS-7 (2 ACTIVE)
BH-RG 13/U COAXIAL
BI-RG 13/U COAXIAL
BX-RG13/U COAXIAL
BO-RG13/U COAXIAL
BP-RG13/U COAXIAL
BN-MCOS-7(6ACTIVE)
BM-KS9011 (2ACTIVE)
BK-MCOP-19 (13 ACTIVE)
BL-KS-9011(2 ACTIVE)
C-RG41/U COAXIAL
AG3 RG/41U COAXIAL
BK-MCOP-19 (13 ACTIVE)
BL-KS-9011 (2 ACTIVE)
Z DHFA 3 (2 ACTIVE)
TO LIGHTING CIRCUIT 115 V.A.C. OR D.C.
U-DCOP 14 (2 ACTIVE)
T-MCOP 30 (29 ACTIVE)
ABOVE DECK
BELOW DECK
BOX
CW-43ACU TRANSMITTER RECEIVER (D-152271)
BA-BO-20124-4 (9 ACTIVE)
BB-BO-20124-3 (11 ACTIVE)
P115
P114
CZC-20AAR-1 H.V. RECTIFIER (D-151516)
CZC-20AAQ REGULATED RECTIFIER NO. B (D-150317)
CZC-20AAQ REGULATED RECTIFIER NO. A (D-150317)
CG-21AAS (250V) OR CG-21AAT (120V) MOTOR-GENERATOR SET (KS-5589 LIST 01 OR 02)
LOCAL PUSH BUTTON STATION
START
STOP
CONTROL UNIT
MOTOR-GENERATOR UNIT
CW-62AAB JUNCTION BOX (D-150869)
Y2-FHFA3 (3 ACTIVE)
X1-120V DHFA 14 / 250V DHFA 9 (2 ACTIVE)
X2-MHFA 10 (8 ACTIVE)
Y1-FHFA 3 (4 ACTIVE)
TO DC SUPPLY 20 AMP AT 120V NOMINAL 10 AMP AT 250V NOMINAL
W-120V DHFA 14 / 250V DHFA 9 (2 ACTIVE)
S-DHFA 14 (2 ACTIVE)
N-MCOP 10 (7 ACTIVE)
O-MCOP 10 (7 ACTIVE)
P2-MCOP 10 (9 ACTIVE)
P1-DCOP 3 (2 ACTIVE)

Figure 12—Cable Interconnections—BXX-20932



LOBE SWITCH CONTACTS (TO ANTENNA)
TO 'ST' SELECTOR UNIT
INTERNAL CONNECTIONS ONLY
T-R KEEP-ALIVE TO 'ST' XMTR
TO MAIN CONTROL UNIT
GND
I F GAIN CONTROL
REC. TUNING CONTROL
GND TO TERM 22
-225 V.
VIDEO BIAS
NOISE DEPRESSOR BIAS
-57 VOLTS
-1200 V.
GND.
GND.
+300
115 V. AC SUPPLY
INTERLOCK DOOR SWITCH
6.3 V. HEATERS UNGROUNDED
6.3 V. HEATERS GROUNDED
TERMS. ON INDICATOR TERM. STRIP
R114 330Ω
R113 4700Ω
P4 5000Ω
I.F. GAIN
R110 68,000Ω
R111 68,000Ω
R112 68,000Ω
R115 1 MEG.
FRAME GND.
P1 100Ω
HUM BALANCE
V1
V2
V3
V4
V5
V6
V7
V8
INDICATOR HEATERS
FB
FG
V12
V13
V14
V15
V16
STEP GENERATOR HEATERS
POWER SUPPLY TERMS.
REGULATOR LAMPS
R68, 1500Ω
LP4 991
LP3 991
LP2 991
LP1 991
-57V.
R67 1500Ω
P8 25,000Ω NOISE SUPPRESSOR
R66, 27,000Ω
R65 .22 MEG.
-225 V.
P9 0.2 MEG. REC. TUNING
T1 (KS-8571)
INTERLOCK
D-4
V10
3B24 FOR D-151810
2×2/879 FOR D-151494
H.V. RECTIFIER
FOCUS
R64 470,000Ω
C36 1 M.F. 2000 V.
R62 150,000Ω
C37 0.1 M.F. 3000 V.
P10 75,000Ω
C33.2 0.5 M.F.
INSULATED SHAFTS
R63 180,000Ω
C35, 2 M.F. 2000 V.
C33.1 0.5 M.F.
R60 0.5 MEG.
P11 25,000Ω
-1900 V.
INTENSITY
H.V. CABLE
R61 0.22 MEG.
V9 RCA 5HP1
GRID
CATHODE RAY
R59 4.7 MEG.
TURRET
R54, 0.27 MEG.
27, .004 M.F. 000 V. TEST
R53 0.27 MEG.
C26 1.0 M.F.
R51 1800Ω
C28 0.5 M.F.
C25, 1.0 M.F.
R57A 47,000Ω
R52 1800Ω
ER PANEL
POWER SUPPLY UNIT

Figure 13—Indicator—Schematic—ESXX-990853

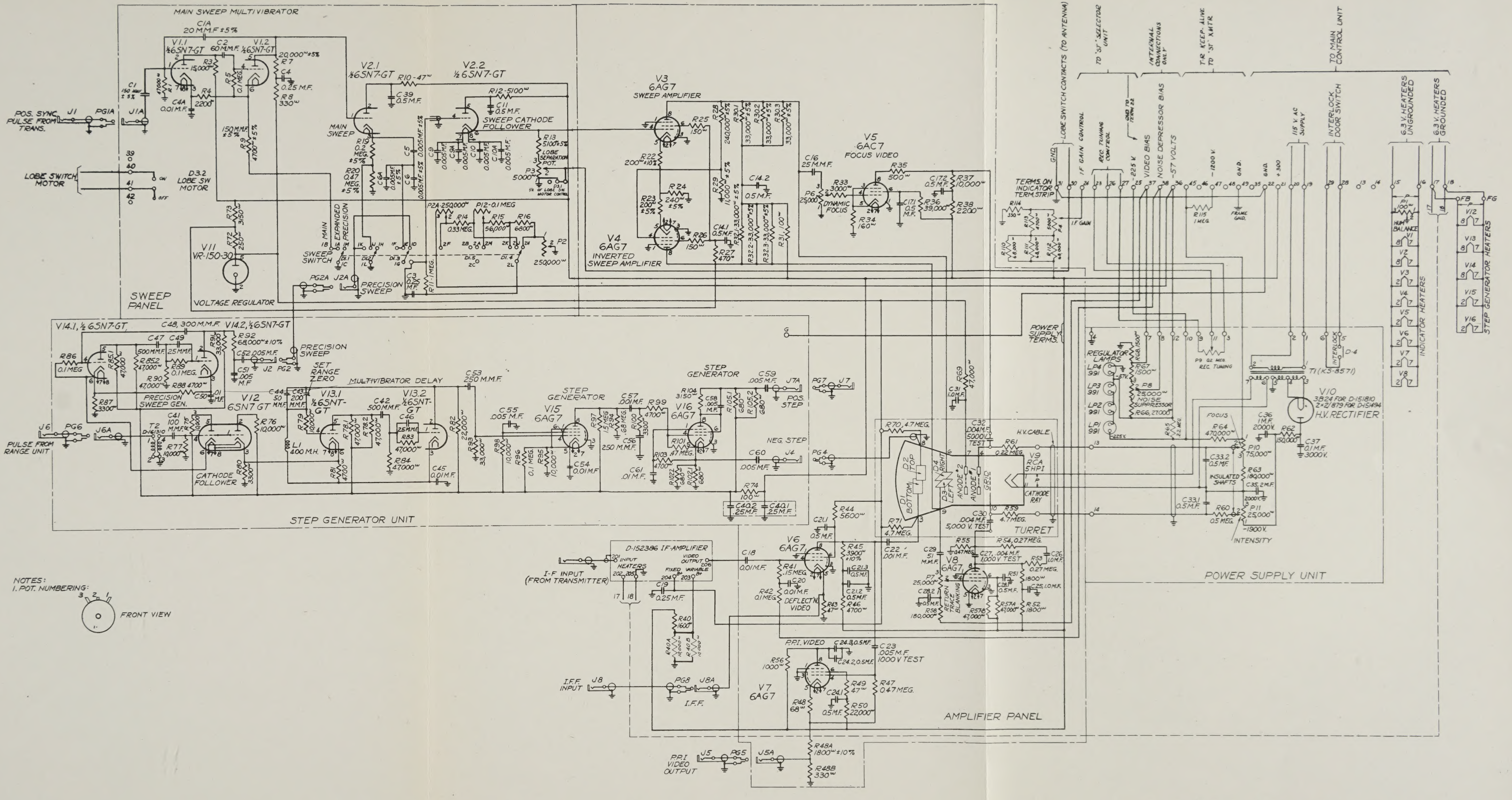

MAIN SWEEP MULTIVIBRATOR
V1.1 ½6SN7-GT
V1.2 ½6SN7-GT
V2.1 ½6SN7-GT
V2.2 ½6SN7-GT
MAIN SWEEP
SWEEP CATHODE FOLLOWER
LOBE SEPARATION POT.
POS. SYNC. PULSE FROM TRANS.
J1
PG1A
J1A
LOBE SWITCH MOTOR
D3.2 LOBE SW MOTOR
ON
OFF
V11 VR-150-30
VOLTAGE REGULATOR
SWEEP PANEL
SWEEP SWITCH
MAIN
EXPANDED
PRECISION
PRECISION SWEEP
PG2A
J2A
V3 6AG7 SWEEP AMPLIFIER
V4 6AG7 INVERTED SWEEP AMPLIFIER
V5 6AC7 FOCUS VIDEO
DYNAMIC FOCUS
V14.1, ½6SN7-GT
V14.2, ½6SN7-GT
PRECISION SWEEP GEN.
PRECISION SWEEP
SET RANGE ZERO
J2
PG2
V12 6SN7 GT
CATHODE FOLLOWER
V13.1 ½6SN7-GT
V13.2 ½6SN7-GT
MULTIVIBRATOR DELAY
L1 400 M.H.
J6
PG6
J6A
PULSE FROM RANGE UNIT
V15 6AG7 STEP GENERATOR
V16 6AG7 STEP GENERATOR
POS. STEP
NEG. STEP
J7
J7A
PG7
J4
PG4
STEP GENERATOR UNIT
TERMS. ON INDICATOR TERM. STRIP
LOBE SWITCH CONTACTS (TO ANTENNA)
TO 'ST' SELECTOR UNIT
INTERNAL CONNECTIONS ONLY
T.R. KEEP ALIVE TO 'ST' XMTR
TO MAIN CONTROL UNIT
I.F. GAIN CONTROL
REC. TUNING CONTROL
VIDEO BIAS
NOISE DEPRESSOR BIAS
-57 VOLTS
-1200 V.
GND.
+300
115 V. AC SUPPLY
INTERLOCK DOOR SWITCH
6.3 V. HEATERS UNGROUNDED
6.3 V. HEATERS GROUNDED
INDICATOR HEATERS
STEP GENERATOR HEATERS
HUM BALANCE
FRAME GND.
POWER SUPPLY TERMS.
REGULATOR LAMPS
LP4 991
LP3 991
LP2 991
LP1 991
NOISE SUPPRESSOR
P9 REC. TUNING
T1 (KS-8571)
V10 3B24 FOR D-151810 2×2/879 FOR D-151494 H.V. RECTIFIER
FOCUS
INTENSITY
INSULATED SHAFTS
POWER SUPPLY UNIT
H.V. CABLE
V9 RCA 5HP1 CATHODE RAY
TURRET
D1 BOTTOM
D2 TOP
D3 LEFT
D4 RIGHT
ANODE #1
ANODE #2
GRID
V6 6AG7 DEFLECTN. VIDEO
V8 6AG7 RETURN TRACE BLANKING
D-152386 IF AMPLIFIER
VIDEO OUTPUT
INPUT HEATERS
FIXED
VARIABLE
I-F INPUT (FROM TRANSMITTER)
P.P.I. VIDEO
V7 6AG7
I.F.F. INPUT
J8
PG8
J8A
I.F.F.
P.P.I. VIDEO OUTPUT
J5
PG5
J5A
AMPLIFIER PANEL
NOTES:
1. POT. NUMBERING:
FRONT VIEW

Figure 13—Indicator—Schematic—ESXX-990853

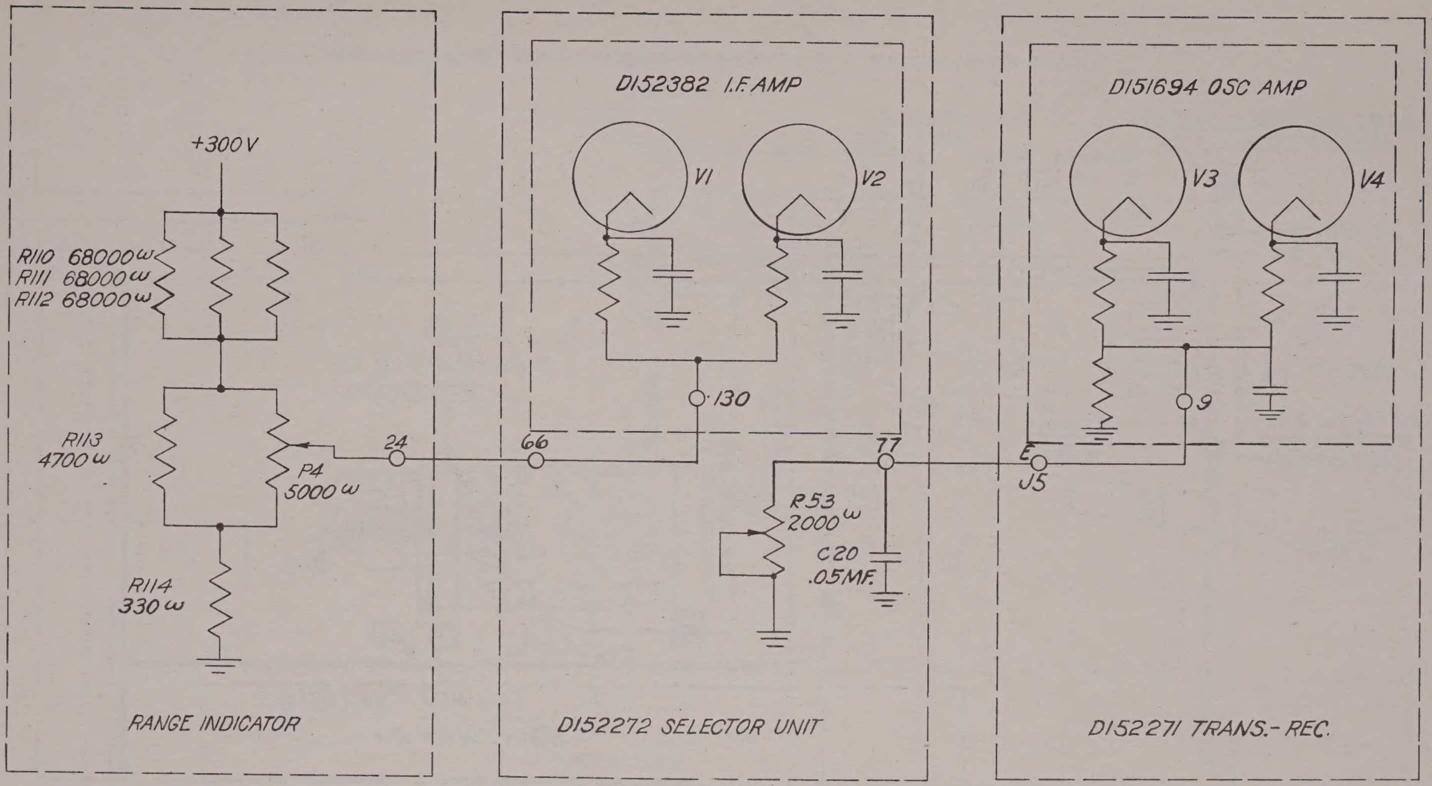

+300V
R110 68000ω
R111 68000ω
R112 68000ω
R113
4700ω
P4
5000ω
R114
330ω
24
RANGE INDICATOR
D152382 I.F. AMP
V1
V2
130
66
77
R53
2000ω
C20
.05MF.
D152272 SELECTOR UNIT
D151694 OSC AMP
V3
V4
9
E
J5
D152271 TRANS.-REC.

Figure 14—IF Gain Control—Simplified Schematic—ESL–990843

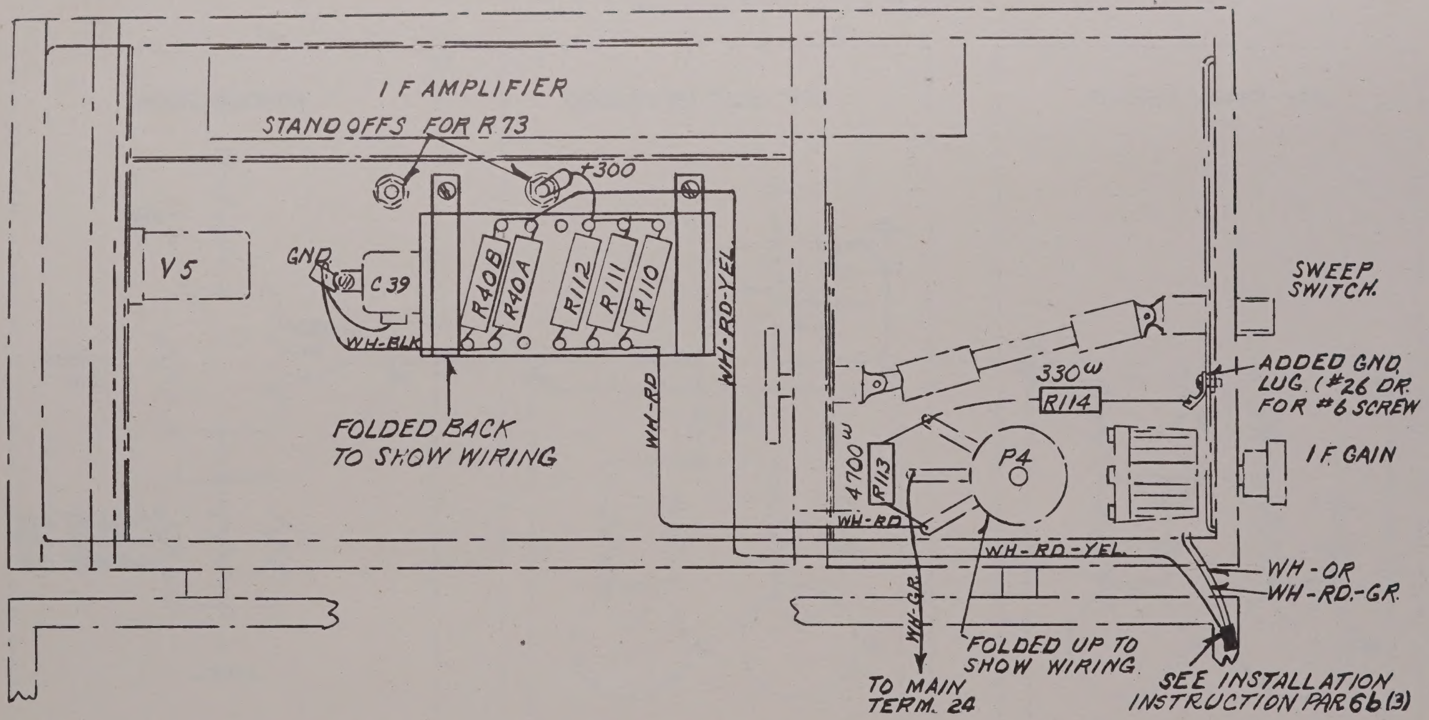

I F AMPLIFIER
STANDOFFS FOR R73
+300
V5
GND.
C39
R40B
R40A
R112
R111
R110
WH-BLK
WH-RD-YEL.
WH-RD
FOLDED BACK
TO SHOW WIRING
SWEEP
SWITCH.
330ω
R114
ADDED GND.
LUG. (#26 DR.
FOR #6 SCREW
4700ω
R113
P4
I.F. GAIN
WH-RD
WH-RD-YEL.
WH-OR
WH-RD.-GR.
WH-GR.
FOLDED UP TO
SHOW WIRING.
TO MAIN
TERM. 24
SEE INSTALLATION
INSTRUCTION PAR. 6b (3)

Figure 15A—Modification of Range Indicator for New Gain Control Circuit—ESA-990844

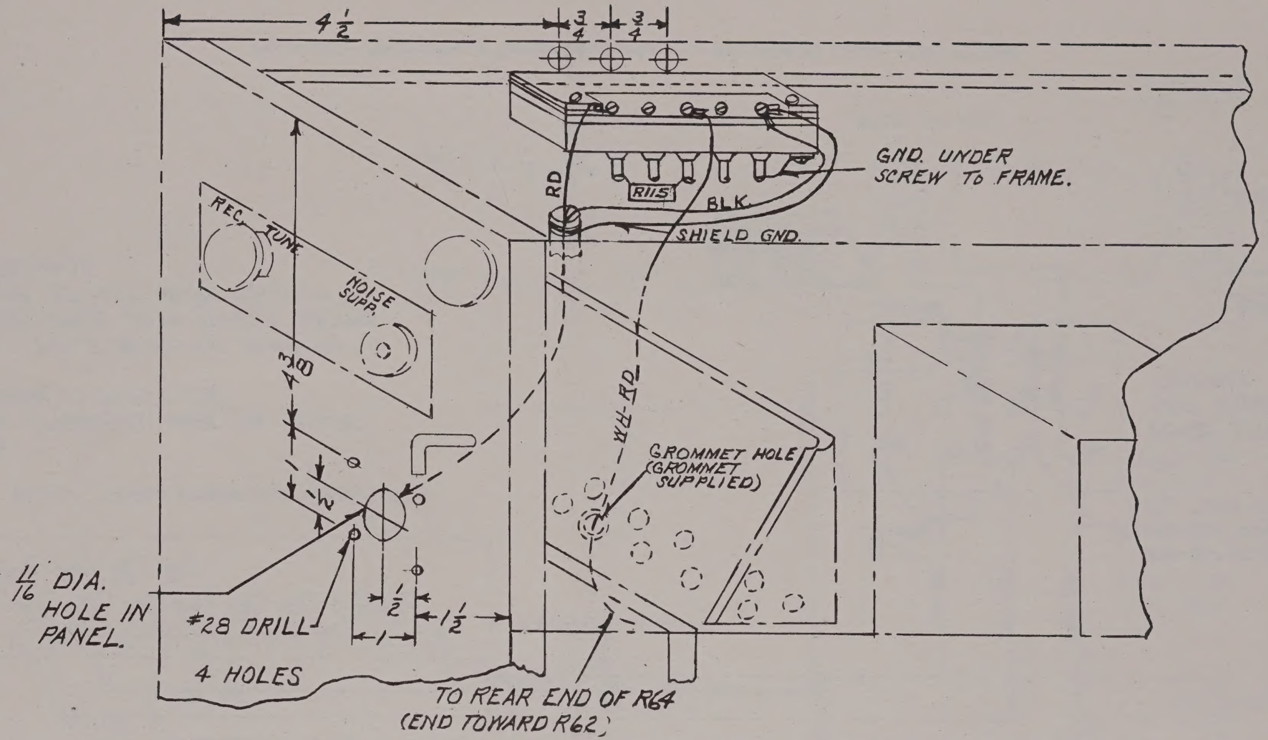
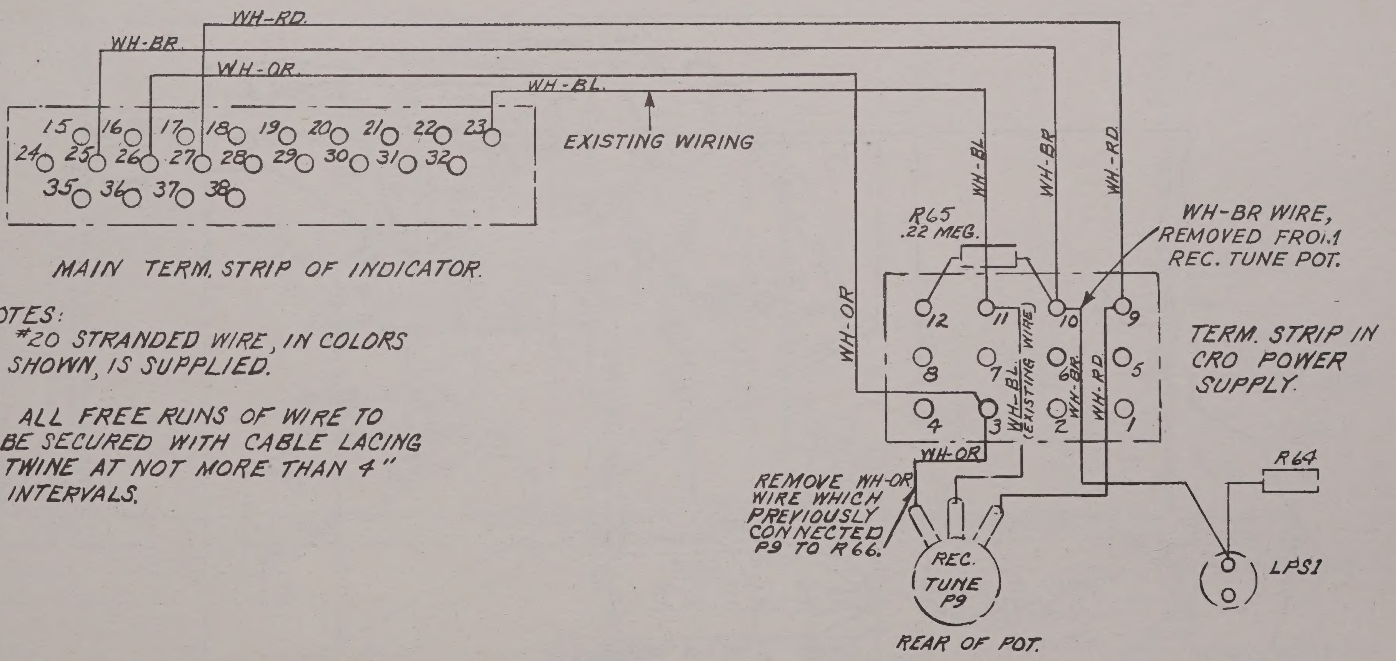

4 1/2
3/4
3/4
GND. UNDER SCREW TO FRAME.
RD
R115
BLK.
SHIELD GND.
REC. TUNE
NOISE SUPP.
4 3/8
WH-RD
GROMMET HOLE (GROMMET SUPPLIED)
3/4
11/16 DIA. HOLE IN PANEL.
#28 DRILL
1/2
1 1/2
1
4 HOLES
TO REAR END OF R64 (END TOWARD R62)

Figure 15B—Modification of Range Indicator for ST Keep-Alive Voltage—ESA-990844


WH-RD.
WH-BR.
WH-OR.
WH-BL.
15 16 17 18 19 20 21 22 23
24 25 26 27 28 29 30 31 32
35 36 37 38
EXISTING WIRING
MAIN TERM. STRIP OF INDICATOR.
WH-BL.
WH-BR
WH-RD.
R65
.22 MEG.
WH-BR WIRE, REMOVED FROM REC. TUNE POT.
12 11 10 9
8 7 6 5
4 3 2 1
WH-BL. (EXISTING WIRE)
WH-BR
WH-RD
WH-OR
WH-OR
TERM. STRIP IN CRO POWER SUPPLY.
R64
REMOVE WH-OR WIRE WHICH PREVIOUSLY CONNECTED P9 TO R66.
REC. TUNE P9
REAR OF POT.
LPS1

NOTES:

1. #20 STRANDED WIRE, IN COLORS SHOWN, IS SUPPLIED.

2. ALL FREE RUNS OF WIRE TO BE SECURED WITH CABLE LACING TWINE AT NOT MORE THAN 4" INTERVALS.

Figure 15C—Modification of Range Indicator for New REC TUNING Circuit—ESA-990844

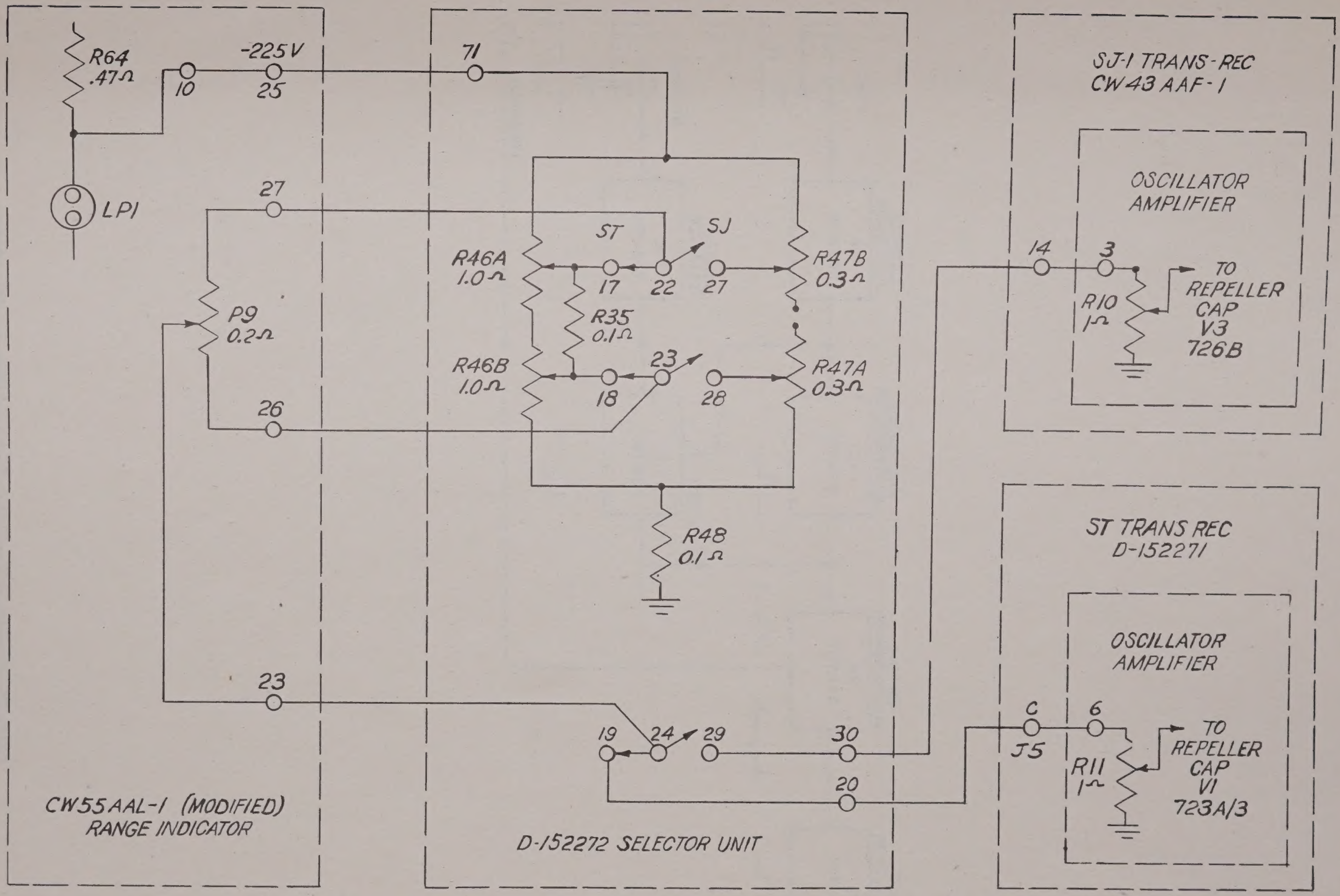

R64
.47Ω
10
-225V
25
LP1
27
P9
0.2Ω
26
23
CW55AAL-1 (MODIFIED)
RANGE INDICATOR
71
ST
SJ
R46A
1.0Ω
17
22
27
R47B
0.3Ω
R35
0.1Ω
R46B
1.0Ω
23
18
28
R47A
0.3Ω
R48
0.1Ω
19
24
29
30
20
D-152272 SELECTOR UNIT
SJ-1 TRANS-REC
CW43AAF-1
OSCILLATOR
AMPLIFIER
14
3
R10
1Ω
TO
REPELLER
CAP
V3
726B
ST TRANS REC
D-152271
OSCILLATOR
AMPLIFIER
C
J5
6
R11
1Ω
TO
REPELLER
CAP
V1
723A/3

Figure 16—Receiver Tuning—Simplified Schematic—ESL-990842

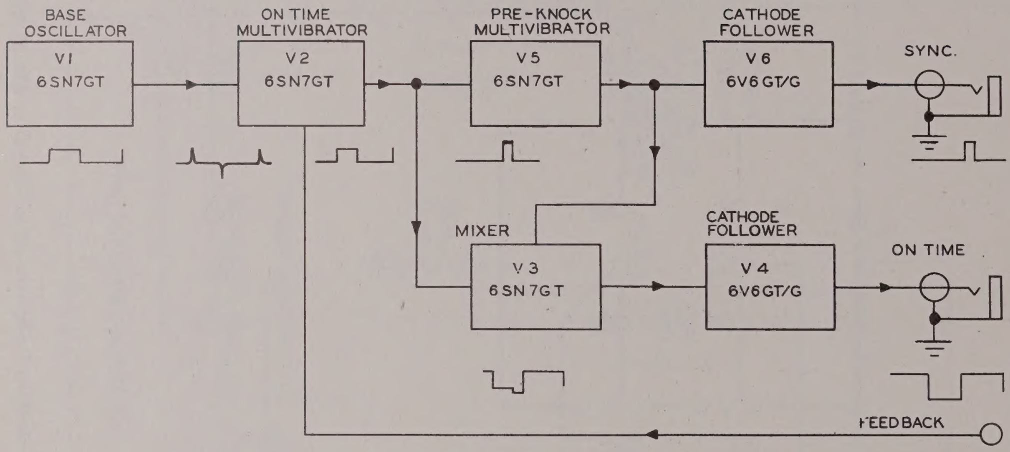

BASE OSCILLATOR
V1
6SN7GT
ON TIME MULTIVIBRATOR
V2
6SN7GT
PRE-KNOCK MULTIVIBRATOR
V5
6SN7GT
CATHODE FOLLOWER
V6
6V6GT/G
SYNC.
MIXER
V3
6SN7GT
CATHODE FOLLOWER
V4
6V6GT/G
ON TIME
FEEDBACK

Figure 17—Modulation Generator—Functional Diagram—ESL-990867

Figure 18—Selector Unit—Schematic—BX–18502

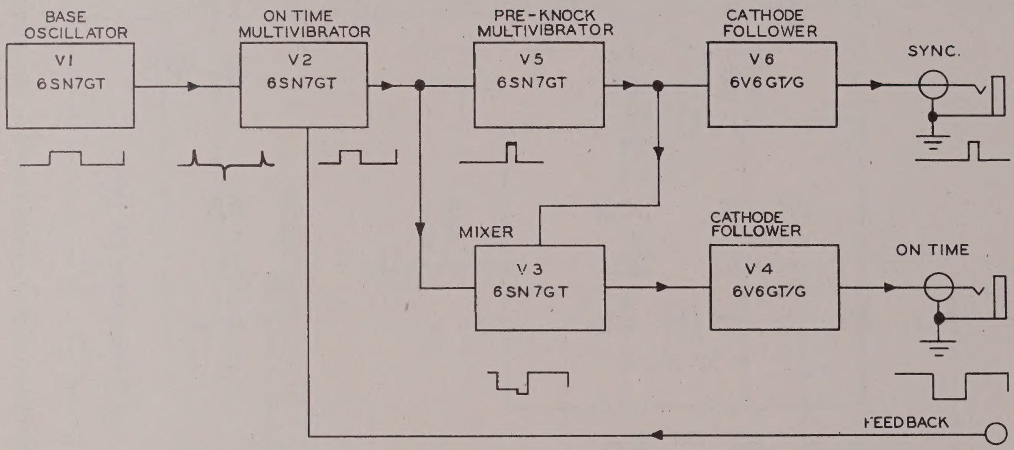
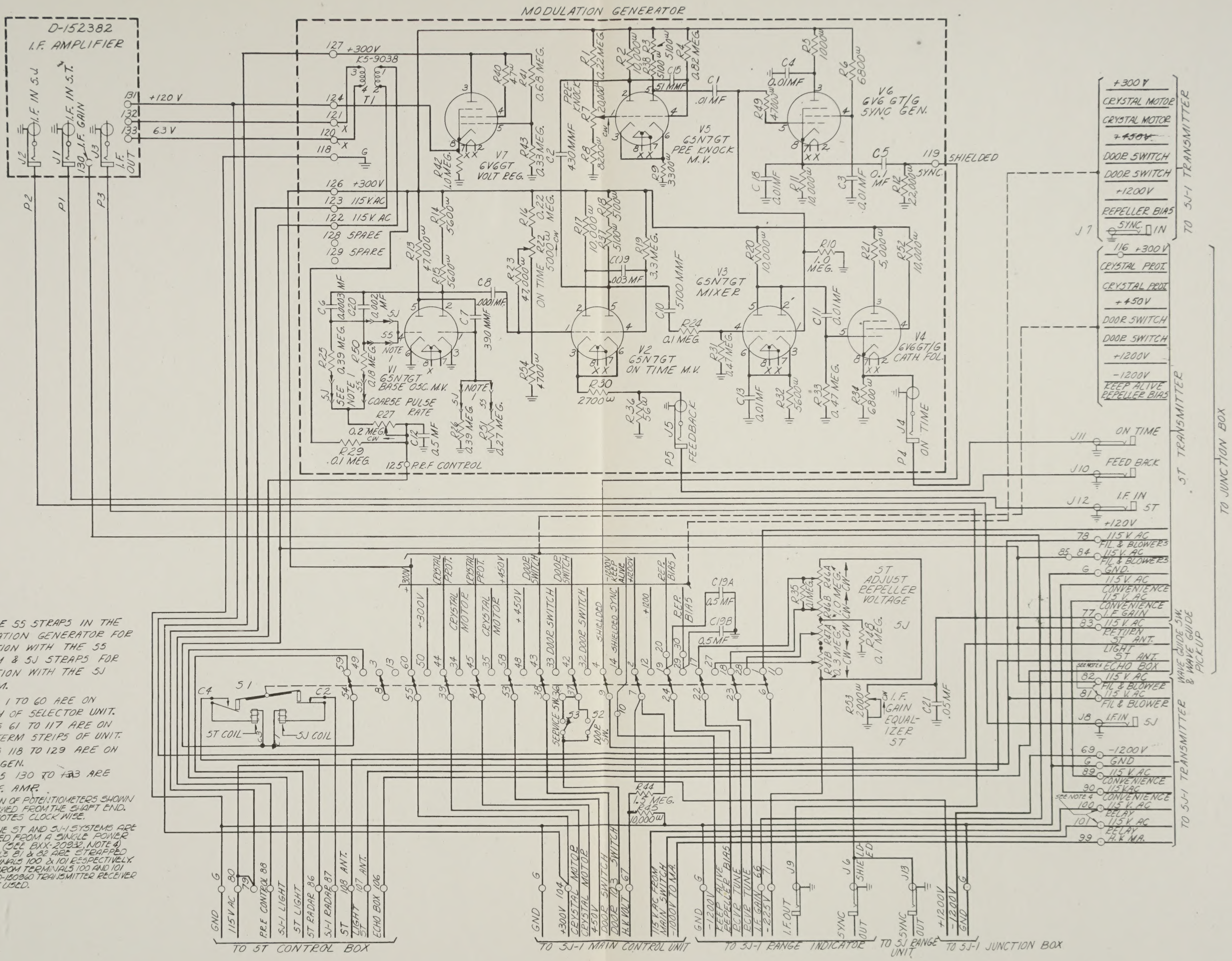

BASE OSCILLATOR
V1
6SN7GT
ON TIME MULTIVIBRATOR
V2
6SN7GT
PRE-KNOCK MULTIVIBRATOR
V5
6SN7GT
CATHODE FOLLOWER
V6
6V6GT/G
SYNC.
MIXER
V3
6SN7GT
CATHODE FOLLOWER
V4
6V6GT/G
ON TIME
FEEDBACK

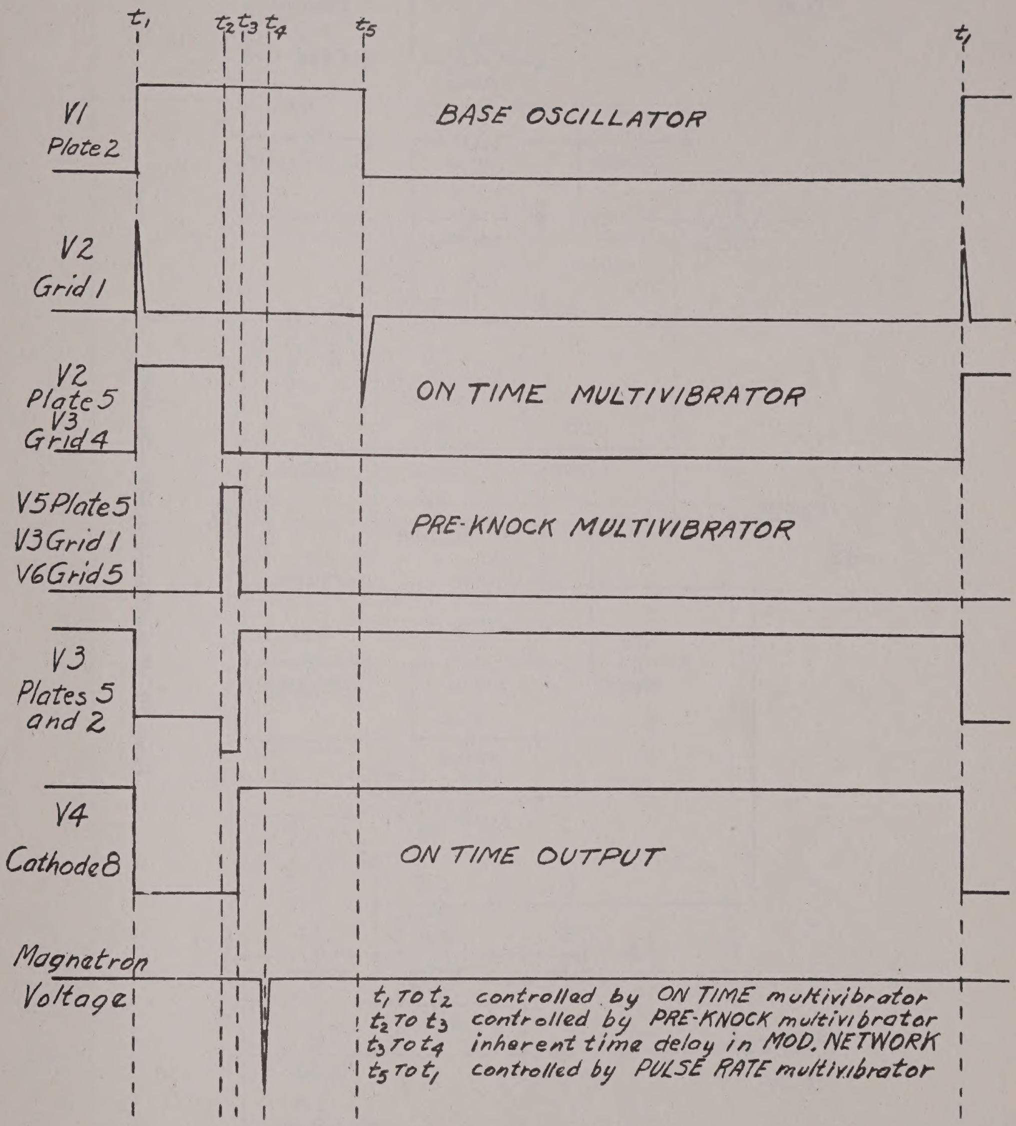
Figure 17—Modulation Generator—Functional Diagram—ESL–990867


D-152382
I.F. AMPLIFIER
I.F. IN 5J
I.F. IN 5.T.
I.F. GAIN
I.F. OUT
J2
J1
J3
P2
P1
P3
B1 +120 V
63 V
MODULATION GENERATOR
127 +300V
K5-9038
T1
V7 6V6GT VOLT REG.
V5 6SN7GT PRE KNOCK M.V.
V6 6V6 GT/G SYNC GEN.
V1 6SN7GT BASE OSC. M.V.
V2 6SN7GT ON TIME M.V.
V3 6SN7GT MIXER
V4 6V6GT/G CATH. FOL.
126 +300V
123 115V. AC
122 115V. AC
128 SPARE
129 SPARE
125 P.R.F. CONTROL
COARSE PULSE RATE
119 SHIELDED
SYNC.
PRE KNOCK
ON TIME
FEEDBACK
J5
P5
J4
P4
ON TIME
5J
55
SEE NOTE 1
J7
+300 V
CRYSTAL MOTOR
CRYSTAL MOTOR
+450V
DOOR SWITCH
DOOR SWITCH
+1200V
REPELLER BIAS
SYNC. IN
TO 5J-1 TRANSMITTER
116 +300V
CRYSTAL PROT.
CRYSTAL PROT.
+450V
DOOR SWITCH
DOOR SWITCH
+1200V
-1200V
KEEP ALIVE
REPELLER BIAS
5T TRANSMITTER
TO JUNCTION BOX
J11 ON TIME
J10 FEED BACK
J12 I.F. IN 5T
+120V
78 115 V. AC FIL. & BLOWERS
85 84 115 V. AC FIL. & BLOWERS
G GND.
115 V. AC CONVENIENCE
115 V. AC CONVENIENCE
77 I.F. GAIN
83 115 V. AC RETURN
5T ANT. LIGHT
5T ANT. ECHO BOX
WAVE GUIDE SW. & WAVE GUIDE PICKUP
82 115 V. AC FIL & BLOWER
81 115 V. AC FIL & BLOWER
J8 I.F. IN 5J
69 -1200V
G GND
89 115 V. AC CONVENIENCE
90 115 V. AC CONVENIENCE
100 115 V. AC RELAY
101 115 V. AC RELAY
99 H.V. MA.
TO 5J-1 TRANSMITTER
SEE NOTE 4
5T ADJUST REPELLER VOLTAGE
5J
I.F. GAIN EQUALIZER 5T
S1
5T COIL
5J COIL
SERVICE SW.
DOOR SW.
+300V
CRYSTAL MOTOR
CRYSTAL MOTOR
+450V
DOOR SWITCH
DOOR SWITCH
SHIELDED
SHIELDED SYNC
+1200
REP. BIAS
GND
115 V AC
P.R.F. CONTROL
5J-1 LIGHT
5T LIGHT
5T RADAR
5J-1 RADAR
5T ANT.
5T LIGHT
5T ANT.
ECHO BOX
TO 5T CONTROL BOX
GND
+300V
CRYSTAL MOTOR
+450V
DOOR SWITCH
DOOR SWITCH
H.V. VOLT
115 V. AC FROM MAIN SWITCH
1000V TO MA.
TO 5J-1 MAIN CONTROL UNIT
GND
-1200V
KEEP ALIVE
REPELLER BIAS
RCVR TUNE
RCVR TUNE
I.F. GAIN
-225V
I.F. OUT
TO 5J-1 RANGE INDICATOR
SYNC OUT
SHIELDED
TO 5J RANGE UNIT
SYNC OUT
+1200V
-1200V
GND
TO 5J-1 JUNCTION BOX

NOTES:

1. PROVIDE 55 STRAPS IN THE MODULATION GENERATOR FOR OPERATION WITH THE 55 SYSTEM & 5J STRAPS FOR OPERATION WITH THE 5J SYSTEM.
2. TERMS 1 TO 60 ARE ON SWITCH OF SELECTOR UNIT. TERMS 61 TO 117 ARE ON VERT TERM STRIPS OF UNIT. TERMS 118 TO 129 ARE ON MOD. GEN. TERMS 130 TO 133 ARE ON I.F. AMP.
3. ROTATION OF POTENTIOMETERS SHOWN IS AS VIEWED FROM THE SHAFT END. CW DENOTES CLOCK WISE.
4. WHEN THE 5T AND 5J-1 SYSTEMS ARE OPERATED FROM A SINGLE POWER SOURCE (SEE BXX-20932, NOTE 4) TERMINALS 81 & 82 ARE STRAPPED TO TERMINALS 100 & 101 RESPECTIVELY. LEADS FROM TERMINALS 100 AND 101 TO THE D-150960 TRANSMITTER RECEIVER ARE NOT USED.

Figure 18—Selector Unit—Schematic—BX-18502



t_1
t_2
t_3
t_4
t_5
t_1
V1 Plate 2
BASE OSCILLATOR
V2 Grid 1
V2 Plate 5 V3 Grid 4
ON TIME MULTIVIBRATOR
V5 Plate 5 V3 Grid 1 V6 Grid 5
PRE-KNOCK MULTIVIBRATOR
V3 Plates 5 and 2
V4 Cathode 8
ON TIME OUTPUT
Magnetron Voltage

t_1 TO t_2 controlled by ON TIME multivibrator
t_2 TO t_3 controlled by PRE-KNOCK multivibrator
t_3 TO t_4 inherent time delay in MOD. NETWORK
t_5 TO t_1 controlled by PULSE RATE multivibrator

Figure 19—Time Plot of Modulation Generator Operating Cycle—ESA–990849

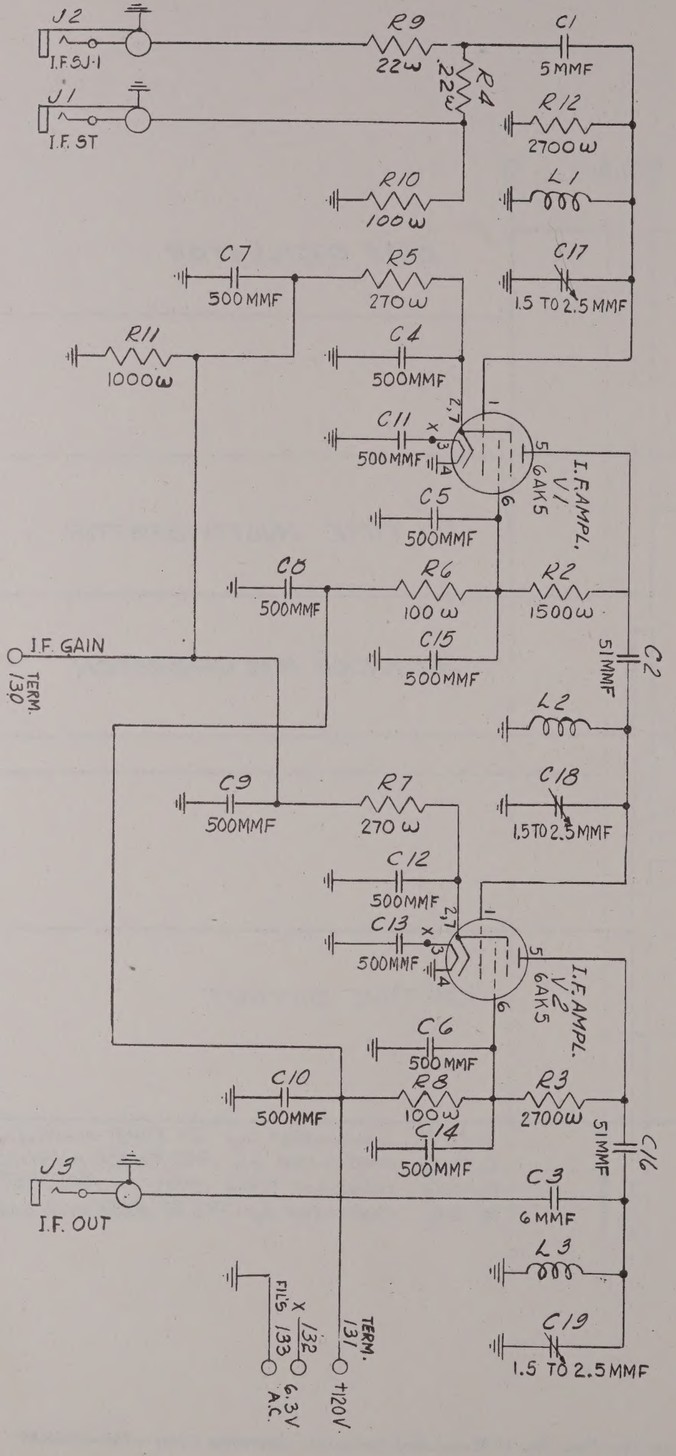

J2
I.F.5J-1
J1
I.F. ST
R9
22ω
R4
22ω
C1
5MMF
R12
2700ω
R10
100ω
L1
C17
1.5 TO 2.5 MMF
C7
500MMF
R5
270ω
R11
1000ω
C4
500MMF
2,7
x
1
C11
500MMF
3
4
5
6
I.F. AMPL.
V1
6AK5
C5
500MMF
C8
500MMF
R6
100ω
R2
1500ω
C15
500MMF
C2
51MMF
I.F. GAIN
TERM.
130
L2
C18
1.5TO2.5MMF
C9
500MMF
R7
270ω
C12
500MMF
C13
500MMF
I.F. AMPL.
V2
6AK5
C6
500MMF
C10
500MMF
R8
100ω
R3
2700ω
C14
500MMF
C16
51MMF
J3
I.F. OUT
C3
6MMF
L3
C19
1.5 TO 2.5 MMF
FIL'S
133
x
132
6.3V
A.C.
TERM.
131
+120V.

Figure 20—IF Amplifier—Schematic—BL-18519

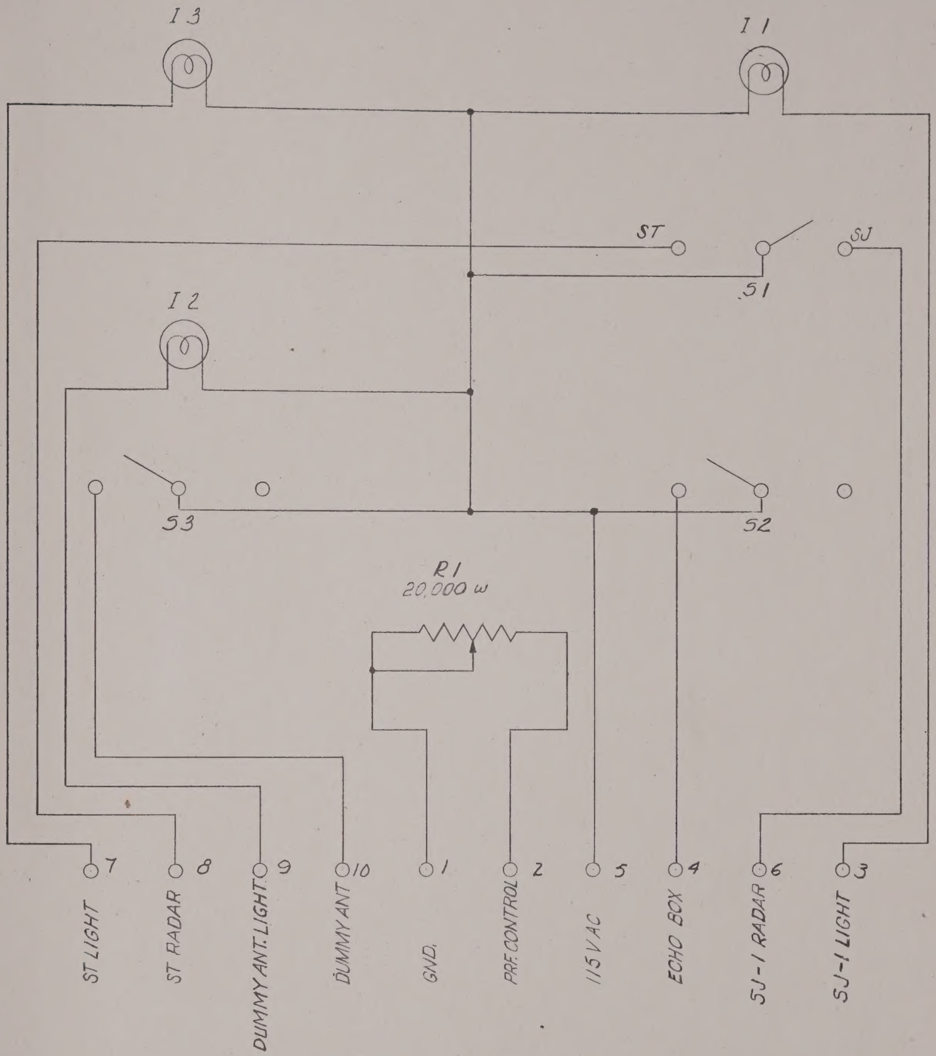

I 3
I 1
ST
SJ
S1
I 2
S3
S2
R1
20,000 w
7
8
9
10
1
2
5
4
6
3
ST LIGHT
ST RADAR
DUMMY ANT. LIGHT
DUMMY ANT
GND.
PRE. CONTROL
115 V AC
ECHO BOX
SJ-1 RADAR
SJ-1 LIGHT

Figure 21—Selector Control Unit—Schematic—BL–19400

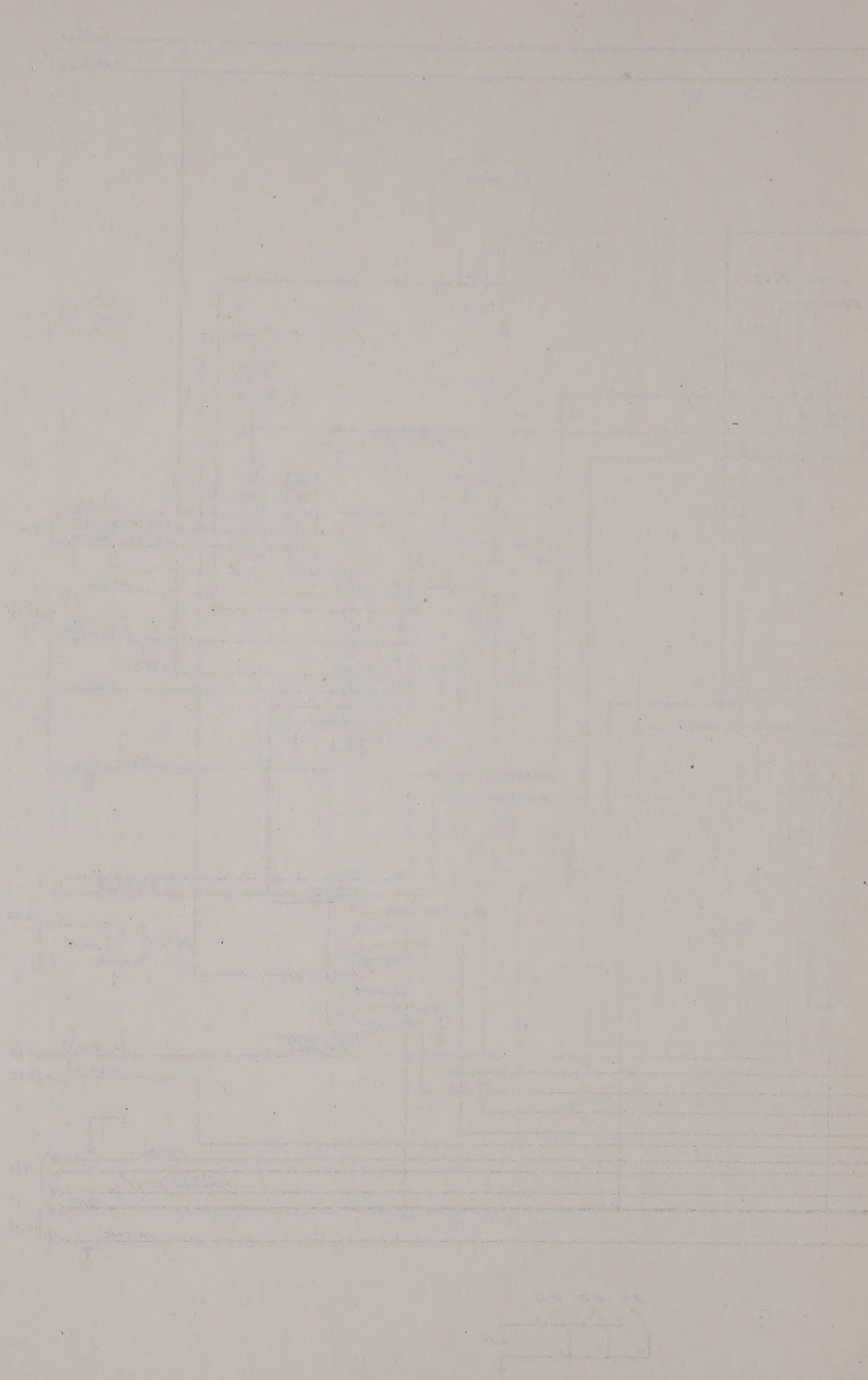


Figure 22—Radar Transmitter-Receiver—Schematic—BR–17958

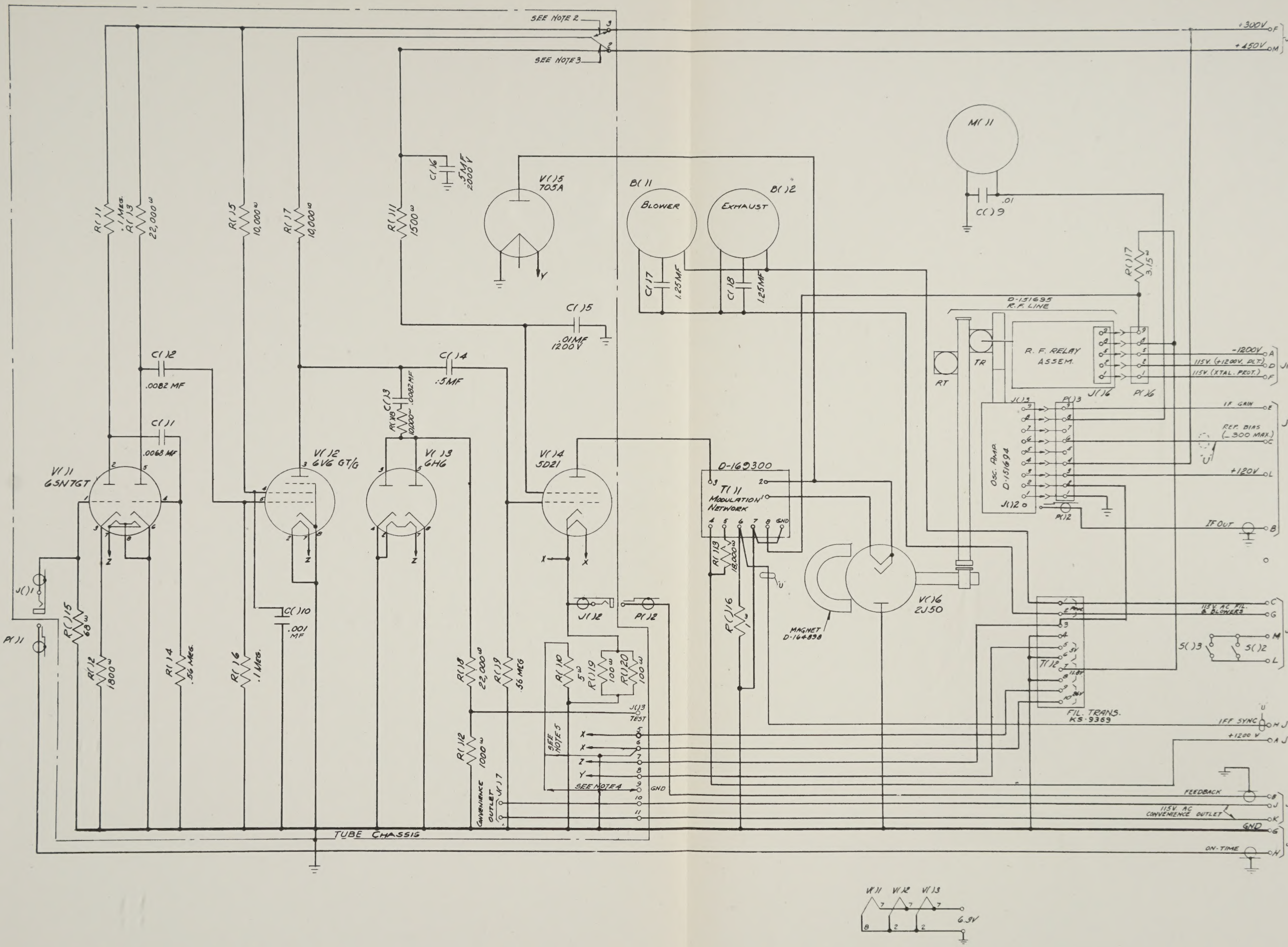

SEE NOTE 2
SEE NOTE 3
+300V
+450V
J()5
M()1
C()9
.01
V()5
705A
B()1
B()2
BLOWER
EXHAUST
C()6
.5MF
2000V
R()1
.1 MEG.
R()3
22,000Ω
R()5
10,000Ω
R()7
10,000Ω
R()11
1500Ω
C()7
1.25MF
C()8
1.25MF
R()17
3.15Ω
C()5
.01MF
1200V
D-151695
R.F. LINE
R. F. RELAY
ASSEM.
TR
RT
J()6
P()6
-1200V
115V. (+1200V. PLT.)
115V. (XTAL. PROT.)
J()4
C()2
.0082 MF
C()4
.5MF
C()3
.0082MF
R()8
10,000Ω
C()1
.0068 MF
V()1
6SN7GT
V()2
6V6 GT/G
V()3
6H6
V()4
5D21
D-169300
T()1
MODULATION NETWORK
J()3
P()3
OSC. AMP.
D-151694
J()2
P()2
IF GAIN
REF. BIAS
(-300 MAX.)
+120V
IF OUT
J()1
P()1
R()15
68Ω
C()10
.001 MF
R()12
1800Ω
R()4
.56 MEG.
R()6
.1 MEG.
R()9
18,000Ω
R()16
MAGNET
D-164898
V()6
2J50
R()10
R()19
100Ω
R()20
100Ω
R()8
22,000Ω
R()9
.56 MEG
R()12
1000Ω
J()3
TEST
SEE NOTE 5
SEE NOTE 4
GND
CONVENIENCE OUTLET
J()7
TUBE CHASSIS
115V. AC FIL. & BLOWERS
T()2
FIL. TRANS.
KS-9369
S()3
S()2
IFF SYNC
+1200 V
FEEDBACK
115V. AC CONVENIENCE OUTLET
GND
ON-TIME
V()1
V()2
V()3
6.3V

Figure 22—Radar Transmitter-Receiver—Schematic—BR-17958

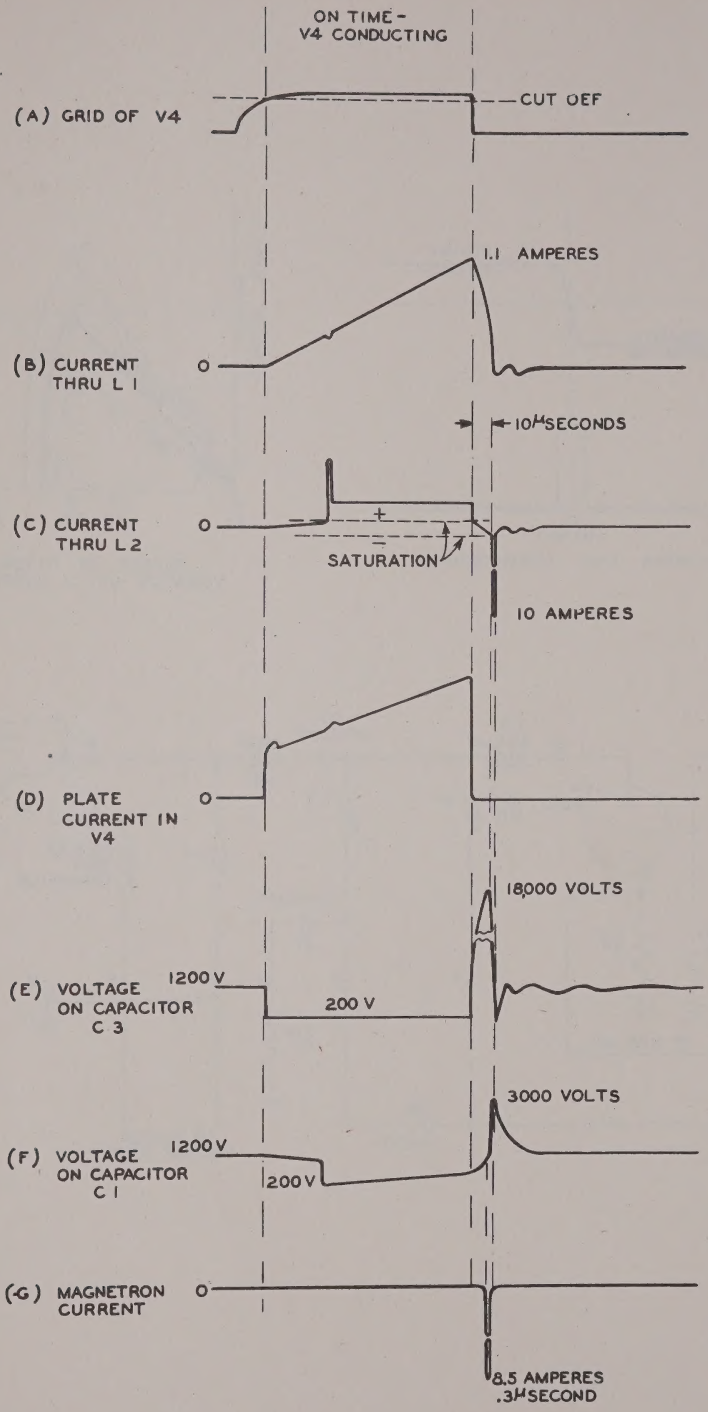
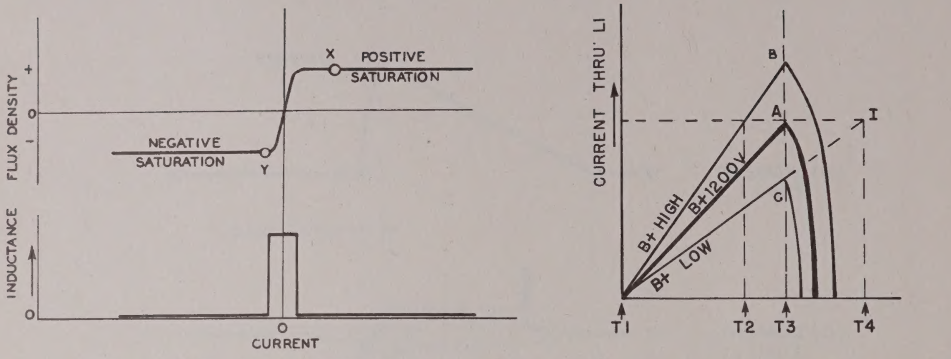


Figure 23—Transmitter Wave Forms—ESO–990850



NON-LINEAR COIL CHARACTERISTIC

EFFECT OF POWER SUPPLY VARIATION ON L1 CURRENT

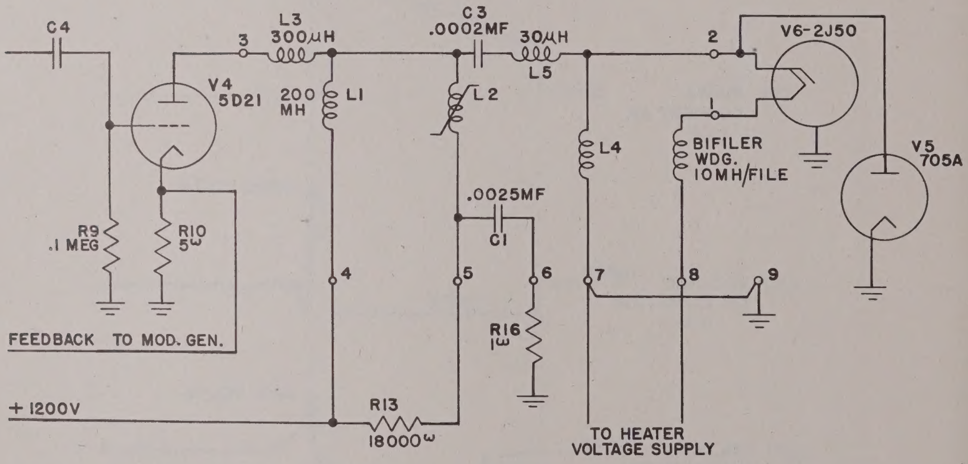
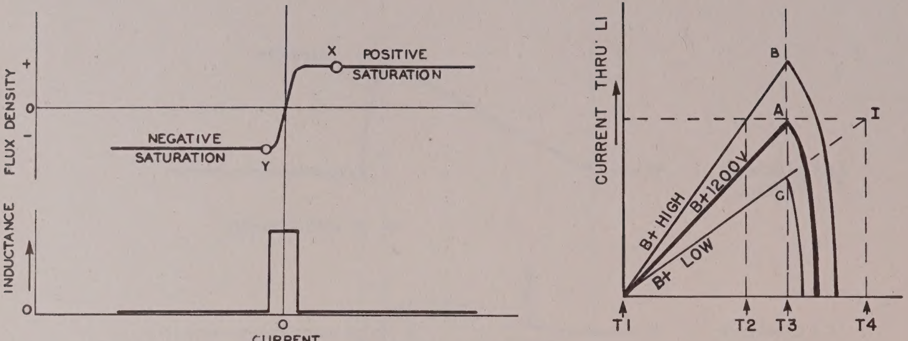

C4
V4
5D21
R9
.1 MEG
R10
5ω
FEEDBACK TO MOD. GEN.
+ 1200V
3
L3
300μH
200
MH
L1
4
R13
18000ω
C3
.0002MF
30μH
L5
L2
.0025MF
C1
5
6
R16
1ω
L4
7
TO HEATER
VOLTAGE SUPPLY
2
1
BIFILER
WDG.
10MH/FILE
8
9
V6-2J50
V5
705A

Figure 24—Modulation Network—Schematic—ESO-990850

Figure 25—RF Line and Oscillator Amplifier—Schematic—BO–13446



NON-LINEAR COIL CHARACTERISTIC

EFFECT OF POWER SUPPLY VARIATION ON L1 CURRENT

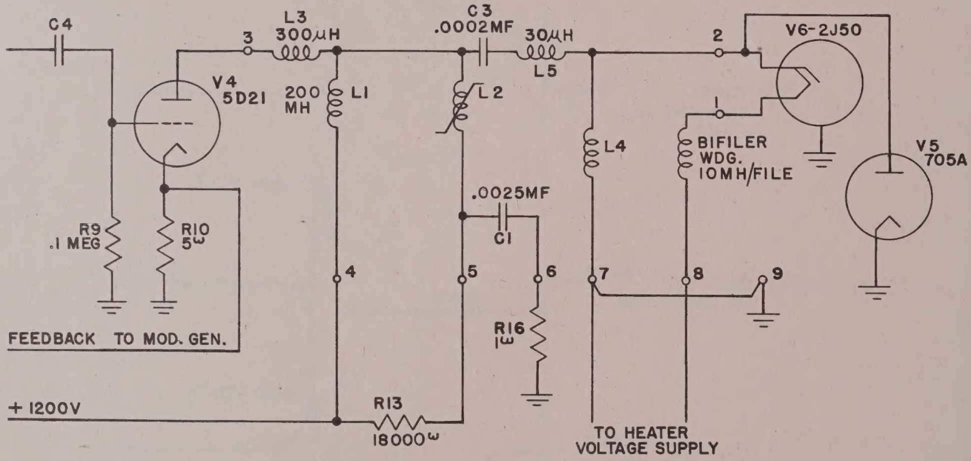

C4
3
L3
300µH
C3
.0002MF
30µH
L5
2
V6-2J50
V4
5D21
200 MH
L1
L2
1
L4
BIFILER WDG. 10MH/FILE
V5
705A
.0025MF
C1
R9
.1 MEG
R10
5ω
4
5
6
7
8
9
R16
1ω
FEEDBACK TO MOD. GEN.
+ 1200V
R13
18000ω
TO HEATER VOLTAGE SUPPLY

Figure 24—Modulation Network—Schematic—ESO-990850

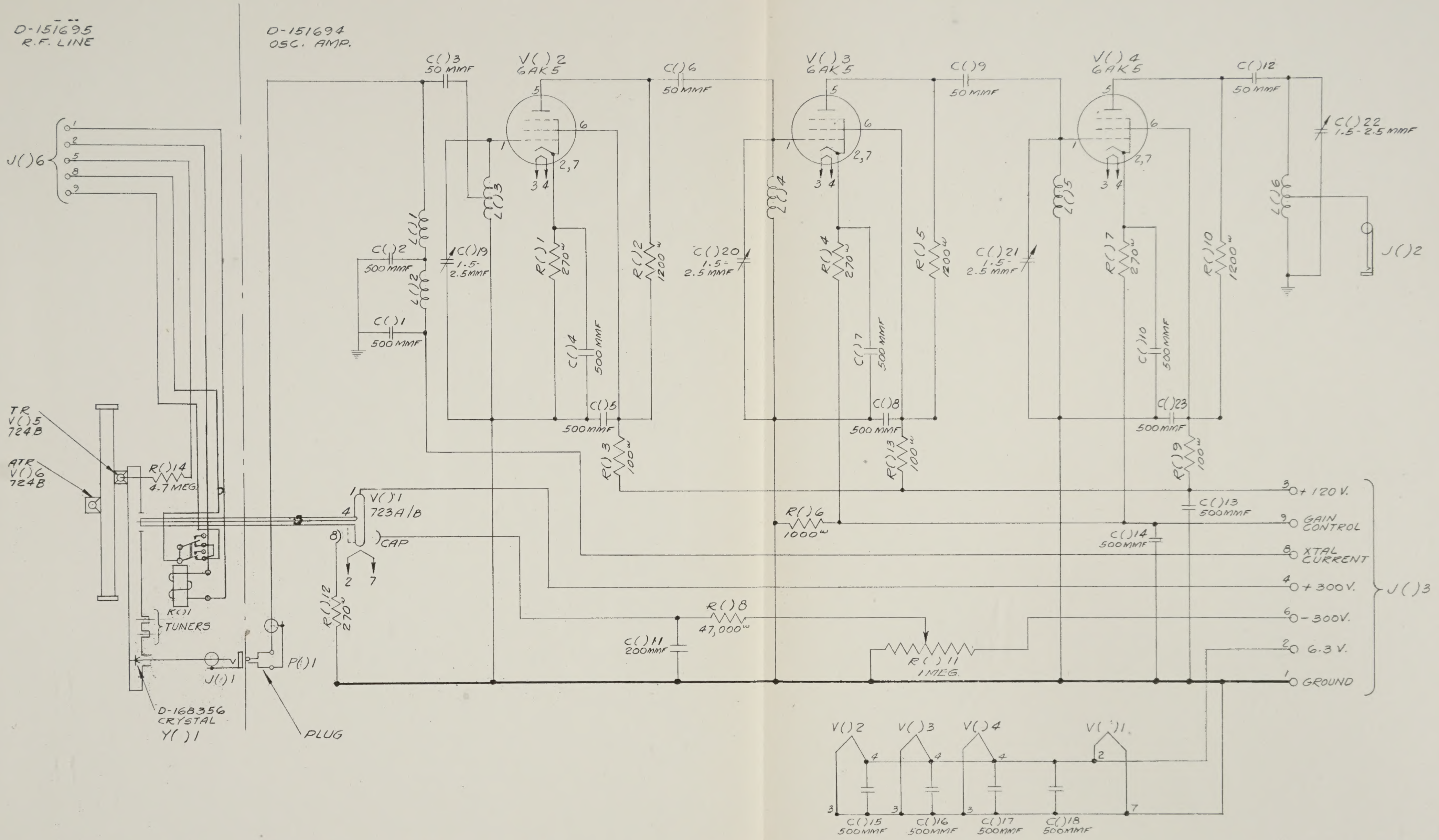
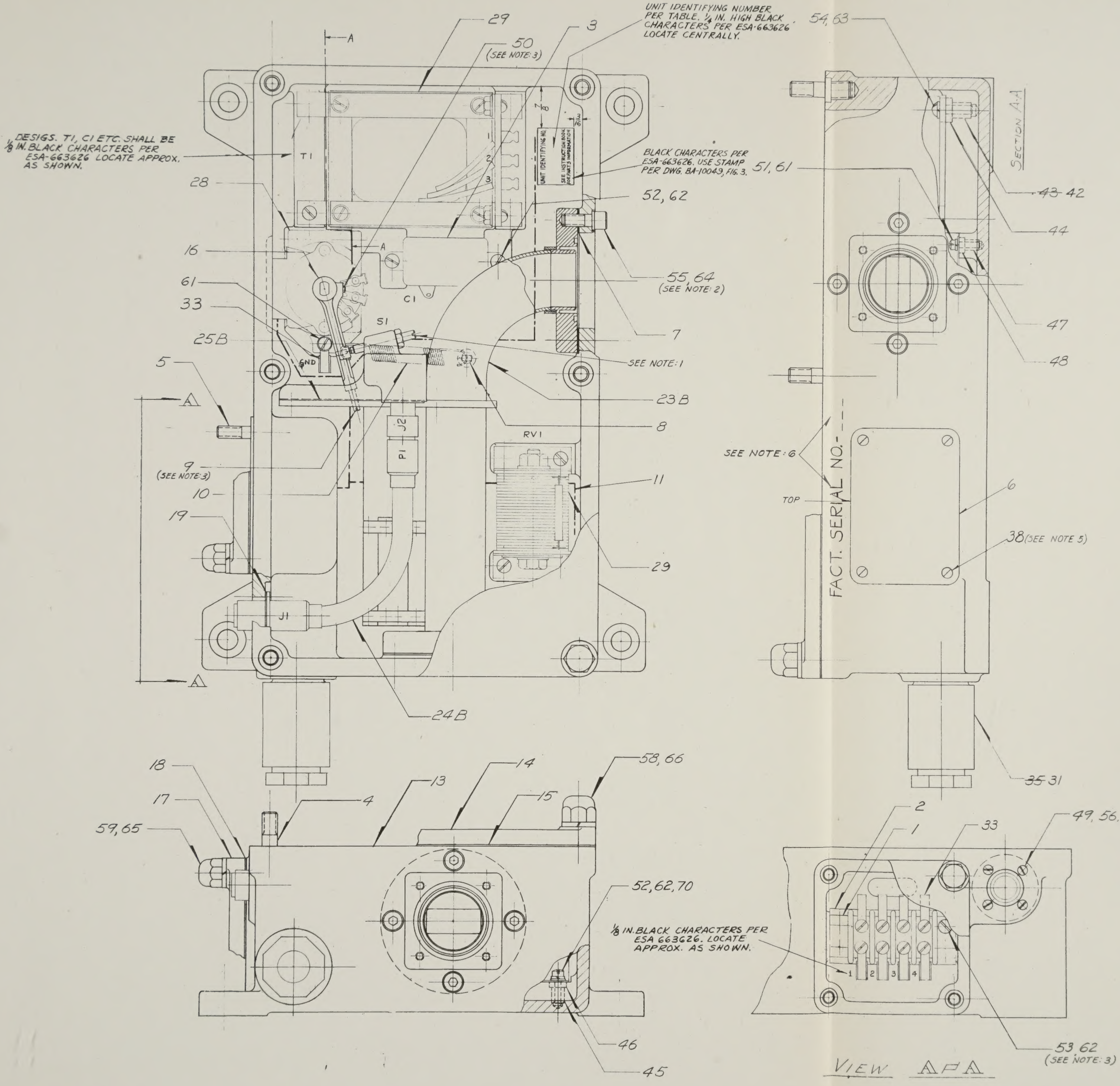

D-151695
R.F. LINE
D-151694
OSC. AMP.
J( )6
1
2
5
8
9
C( )3
50 MMF
V( )2
6AK5
C( )6
50 MMF
V( )3
6AK5
C( )9
50 MMF
V( )4
6AK5
C( )12
50 MMF
C( )22
1.5-2.5 MMF
L( )1
L( )2
L( )3
L( )4
L( )5
L( )6
C( )2
500 MMF
C( )1
500 MMF
C( )19
1.5-
2.5 MMF
C( )20
1.5-
2.5 MMF
C( )21
1.5-
2.5 MMF
R( )1
270Ω
R( )2
1200Ω
R( )4
270Ω
R( )5
1200Ω
R( )7
270Ω
R( )10
1200Ω
C( )4
500 MMF
C( )7
500 MMF
C( )10
500 MMF
C( )5
500 MMF
C( )8
500 MMF
C( )23
500 MMF
R( )3
100Ω
R( )13
100Ω
R( )9
100Ω
J( )2
TR
V( )5
724B
ATR
V( )6
724B
R( )14
4.7 MEG.
V( )1
723A/B
CAP
2
7
K( )1
TUNERS
J( )1
P( )1
PLUG
D-168356
CRYSTAL
Y( )1
R( )12
270Ω
R( )6
1000Ω
C( )13
500 MMF
C( )14
500 MMF
C( )11
200 MMF
R( )8
47,000Ω
R( )11
1 MEG.
3 + 120 V.
9 GAIN CONTROL
8 XTAL CURRENT
4 + 300 V.
6 - 300 V.
2 6.3 V.
1 GROUND
J( )3
V( )2
V( )3
V( )4
V( )1
C( )15
500 MMF
C( )16
500 MMF
C( )17
500 MMF
C( )18
500 MMF

Figure 25—RF Line and Oscillator Amplifier—Schematic—BO-13446

Figure 26—Wave Guide Pick-Up—Assembly—BR–19554


UNIT IDENTIFYING NUMBER PER TABLE. 1/4 IN. HIGH BLACK CHARACTERS PER ESA-663626 LOCATE CENTRALLY.
DESIGS. T1, C1 ETC. SHALL BE 1/8 IN. BLACK CHARACTERS PER ESA-663626 LOCATE APPROX. AS SHOWN.
BLACK CHARACTERS PER ESA-663626. USE STAMP PER DWG. BA-10049, FIG. 3.
UNIT IDENTIFYING NO.
SEE INSTRUCTION BOOK FOR PARTS INFORMATION
29
50 (SEE NOTE: 3)
3
A
T1
28
16
61
33
25B
5
9 (SEE NOTE: 3)
10
19
C1
S1
GND
J2
P1
J1
RV1
52, 62
55, 64 (SEE NOTE: 2)
7
SEE NOTE: 1
23B
8
11
29
24B
54, 63
51, 61
SECTION A-A
43 42
44
47
48
SEE NOTE: 6
TOP
FACT. SERIAL NO.
6
38 (SEE NOTE 5)
35 31
18
17
59, 65
4
13
14
15
58, 66
52, 62, 70
1/8 IN. BLACK CHARACTERS PER ESA 663626. LOCATE APPROX. AS SHOWN.
46
45
2
1
33
49, 56, 60
1 2 3 4
53, 62 (SEE NOTE: 3)
VIEW A-A

REQ.	PIECE	ITEM	NAME
4		70	#8 .172 × 5/16 × .032 BR. WASHER NIC PLT. 561A FIN .0002 THK.
~~4~~		~~69~~	~~#6 .150 × 3/8 × .032 BR. WASHER~~
~~9~~		~~68~~	~~#6 .150 × 3/8 × .032 BR. WASHER~~
		67	
6		66	5/16 (.312) × 5/32 × 3/32 NON TANGLING LOCK WASHERS CORROSION RESISTING STL
4		65	1/4 (.250) × 9/64 × 5/64
8		64	1/4 (.250) × 3/64 × 3/64
4		63	#10 (.190) × 7/16 × 3/64
10		62	#8 (.164) × 3/64 × 1/64
4		61	#6 (.138) × 3/64 × 1/32
4		60	#4 (.112) × 7/32 × 1/32
4		59	1/4-28 NF ACORN NUT
6		58	5/16-24 NF ACORN NUT
		57	
4		56	.112-40 HEX. STL. NUT ZINC PLT. 5G3A-FINISH .0002 THICK PHOSPHATE 5G4A FIN.
8		55	1/4-28 NF × 5/8 STL. HEX. SOCKET HD. CAP. SCR.
4		54	.190-32 × 1/2 R.H. STL. M. SCR.
4		53	.164-32 × 3/4 R.H. STL. M. SCR.
6		52	.164-32 × 7/16 FIL. H. STL. M. SCR.
3		51	.138-32 × 3/8 FIL. H. STL. M. SCR.
1		50	.112-40 × 1/4 STL. HEX. SOCKET SET SCR. FLAT POINT
4		49	.112-40 × 1/2 F.H. STL. M. SCR.
3		48	RL185B-6 RING ROSAN INSERT CADMIUM PL. .0003 THK. FIN. MFD. BY BARDWELL & McALISTER, INC. HOLLYWOOD, CALIF. CHROMATE 5G1A FIN.
3		47	R103SB-5 INSERT
6		46	RL215B-6 RING
6		45	R104SB-6 INSERT
4		44	RL235B-7 RING
~~4~~		~~43~~	~~R105SB-7 INSERT~~
4		42	R205SB-7 INSERT
		41	
4		38	112-40 × 1/4 R.H. STL. M. SCR. NIC. PLT. 561A FIN. .0002 THK. CHROM. PLT. 409A FIN. .00002 THK.
		37	
~~1~~		~~35~~	~~TERMINAL TUBE SIZE "C" TYPE LVII PER DWG. 9-S-5355-L BUREAU OF SHIPS - NAVY DEPT.~~
9		33	TERMINAL #211 - #6 HOLE ZIERICK MFG. CO. N.Y.
1		31	TERMINAL TUBE SIZE "C" TYPE XXI PER DWG. 9-S-5010-L BUREAU OF SHIPS - NAVY DEPT.
		30	
1		29	KS15074 RECTIFIER
1		28	KS15073 LIST 05 ROTARY SOLENOID
		27	
		26	
1	BA 19578	25B	WAVE GUIDE SHUTTER ASSEM.
1	BO 19565	24B	COAXIAL PLUG & JACK ASSEM.
1	BO 19559	23B	WAVE GUIDE ASSEM.
		22	
		21	
~~4~~	~~BA 28554~~	~~20~~	~~INSERT~~
1	BA 19580	19	GASKET
1	BA 19568	18	GASKET
1	BL 19567	17	COVER
1	BO 19564	16	LEVER
1	BO 19563	15	GASKET
1	BO 19562	14	COVER
1	BR 19557	13	HOUSING
1	BO-19556	12	WIRING DIAGRAM
1	BO-53437	11	LOCAL CABLE
1	BA 19542	10	COIL SPRING
1	BA 19540	9	SCREW
1	BA 19539	8	STUD
2	BA 19533	7	GASKET
1	BR-28803-44	6	NAMEPLATE
4	BA 10140-19	5	STUD (SEE NOTE 4)
6	BA 10140-18	4	STUD (SEE NOTE 4)
1	ESA 682063-65	3	CAPACITOR
1	BA 10009-23	2	STRIP
1	BA 10004-23	1	TERMINAL BLOCK

STOCK LIST

Figure 26—Wave Guide Pick-Up—Assembly—BR-19554

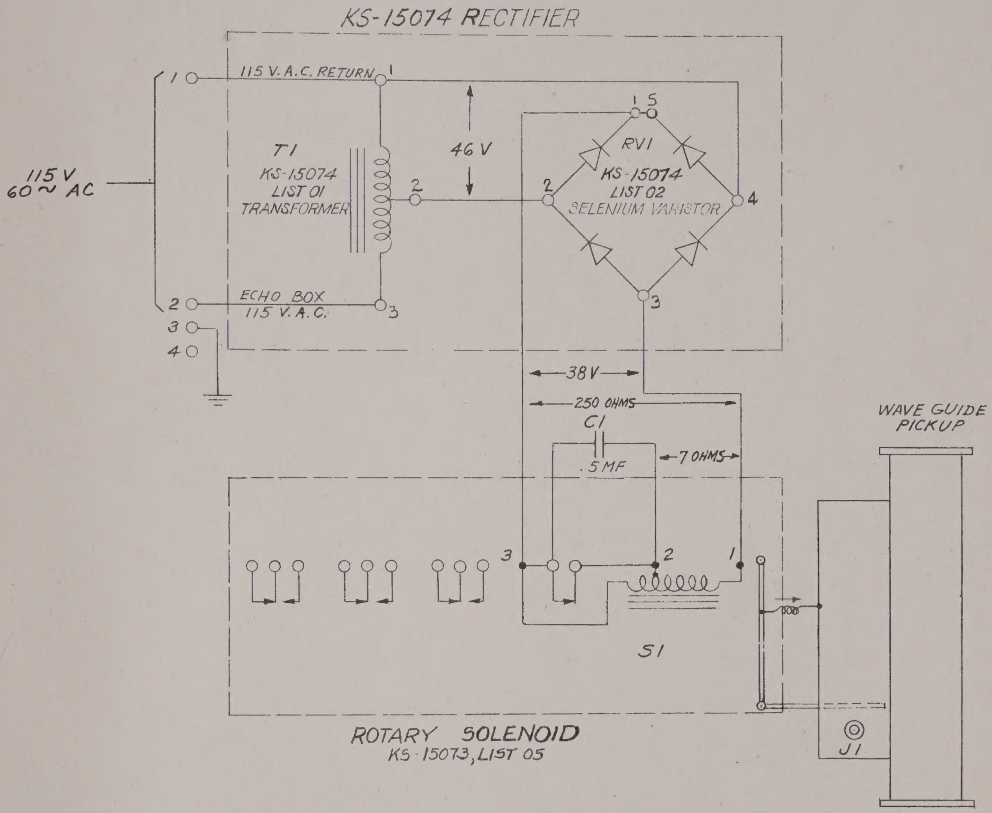
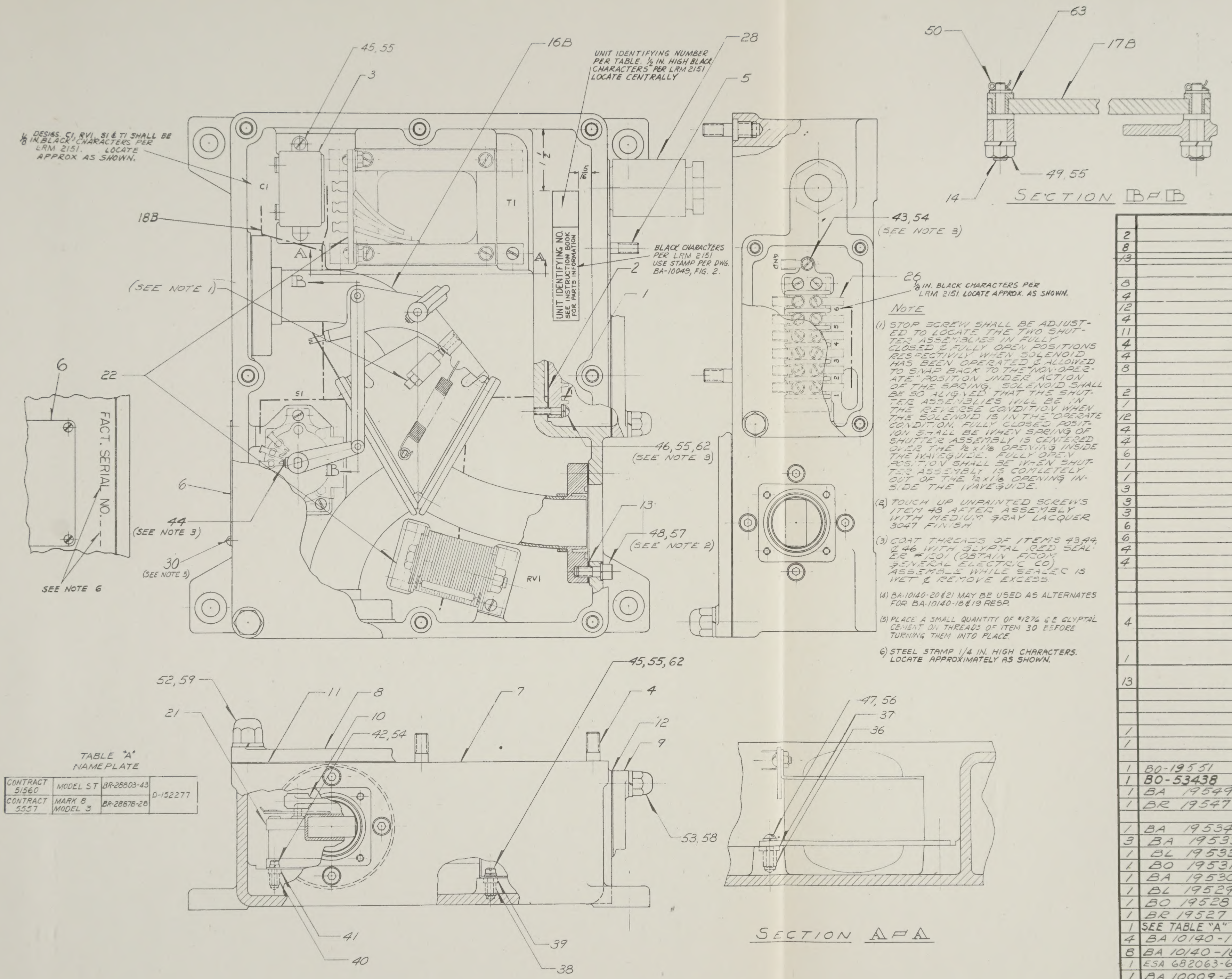

KS-15074 RECTIFIER
115 V.A.C. RETURN
1
1 5
T1
KS-15074
LIST 01
TRANSFORMER
46 V
2
2
RV1
KS-15074
LIST 02
SELENIUM VARISTOR
4
115 V
60 ~ AC
1
2
3
4
ECHO BOX
115 V.A.C.
3
3
38 V
250 OHMS
C1
.5 MF
7 OHMS
WAVE GUIDE PICKUP
3
2
1
S1
J1
ROTARY SOLENOID
KS-15073, LIST 05

Figure 27—Wave Guide Pick-Up—Schematic—BL-19555

Figure 28—Wave Guide Switching Unit—Assembly—BR–19552


45, 55
3
16B
28
5
UNIT IDENTIFYING NUMBER PER TABLE. ½ IN. HIGH BLACK CHARACTERS PER LRM 2151 LOCATE CENTRALLY
1/8 DESIGS. C1, RV1, S1 & T1 SHALL BE 1/8 IN. BLACK CHARACTERS PER LRM 2151. LOCATE APPROX AS SHOWN.
C1
T1
18B
A
A
B
(SEE NOTE 1)
1 1/2
5/16
UNIT IDENTIFYING NO.
SEE INSTRUCTION BOOK FOR PARTS INFORMATION
BLACK CHARACTERS PER LRM 2151 USE STAMP PER DWG. BA-10049, FIG. 2.
2
1
22
6
FACT. SERIAL NO.
S1
B
6
44 (SEE NOTE 3)
30 (SEE NOTE 5)
SEE NOTE 6
46, 55, 62 (SEE NOTE 3)
13
48, 57 (SEE NOTE 2)
RV1
43, 54 (SEE NOTE 3)
GND
26
1/8 IN. BLACK CHARACTERS PER LRM 2151. LOCATE APPROX. AS SHOWN.
50
63
17B
14
49, 55
SECTION B-B
52, 59
21
11
8
10
42, 54
7
45, 55, 62
4
12
9
53, 58
41
40
39
38
47, 56
37
36
SECTION A-A

NOTE

(1) STOP SCREW SHALL BE ADJUSTED TO LOCATE THE TWO SHUTTER ASSEMBLIES IN FULLY CLOSED & FULLY OPEN POSITIONS RESPECTIVILY WHEN SOLENOID HAS BEEN OPERATED & ALLOWED TO SNAP BACK TO THE "NON-OPERATE" POSITION UNDER ACTION OF THE SPRING. SOLENOID SHALL BE SO ALIGNED THAT THE SHUTTER ASSEMBLIES WILL BE IN THE REVERSE CONDITION WHEN THE SOLENOID IS IN THE "OPERATE" CONDITION. FULLY CLOSED POSITION SHALL BE WHEN SPRING OF SHUTTER ASSEMBLY IS CENTERED OVER THE ½ x 1⅛ OPENING INSIDE THE WAVEGUIDE. FULLY OPEN POSITION SHALL BE WHEN SHUTTER ASSEMBLY IS COMLETELY OUT OF THE ½ x 1⅛ OPENING INSIDE THE WAVEGUIDE.

(2) TOUCH UP UNPAINTED SCREWS ITEM 48 AFTER ASSEMBLY WITH MEDIUM GRAY LACQUER 3047 FINISH

(3) COAT THREADS OF ITEMS 43, 44, & 46 WITH GLYPTAL RED SEALER #1201 (OBTAIN FROM GENERAL ELECTRIC CO) ASSEMBLE WHILE SEALER IS WET & REMOVE EXCESS.

(4) BA-10140-20 & 21 MAY BE USED AS ALTERNATES FOR BA-10140-18 & 19 RESP.

(5) PLACE A SMALL QUANTITY OF #1276 G E GLYPTAL CEMENT ON THREADS OF ITEM 30 BEFORE TURNING THEM INTO PLACE.

6) STEEL STAMP 1/4 IN. HIGH CHARACTERS. LOCATE APPROXIMATELY AS SHOWN.

TABLE "A"
NAMEPLATE

CONTRACT 51560	MODEL ST	BR-28803-43	D-152277
CONTRACT 5557	MARK 8 MODEL 3	BR-28878-28	

REQ.	PIECE	ITEM	NAME	
2		63	#5-.139x5/32x.025 BR. WASHER	NK. PL. 561A FIN. .0002 THK.
8		62	#8-.172x5/16x.032 BR. WASHER	
~~13~~		~~51~~	~~#6-.150x[illegible]x.032 BR. WASHER~~	
8		59	5/16(.312)x5/32x3/32 NON TANGLING LOCKWASHER	CORROSION RESISTING STL.
4		58	1/4(.250)x5/64x5/64	
12		57	1/4(.250)x3/64x3/64	
4		56	#10(.190)x1/16x3/64	
11		55	#8(.164)x3/64x3/64	
4		54	#6(.138)x3/64x1/32	
4		53	1/4-28 NF ACORN NUT	
8		52	5/16-24 NF ACORN NUT	
2		50	3/64 x 5/16 STL. COTTER PIN	ZINC PLT. 563A FIN. .0002 THK. & PHOSPHATE 564A FIN.
1		49	.164-32 HEX. STL. NUT	
12		48	1/4-28 NF x 5/8 STL. HEX. SOCKET HD. CAP SCR.	
4		47	.190-24 x 1/2 R.H.STL.M.SCR.	
4		46	.164-32 x 3/8 R.H.STL.M.SCR.	
6		45	.164-32 x 7/16 FIL.H.STL.M.SCR.	
1		44	.138-32 x 1/4 STL. HEX. SOCKET SET SCR. FLAT POINT	
1		43	.138-32 x 5/8 R.H.STL.M.SCR.	
3		42	.138-32 x 3/8 FIL.H.STL.M.SCR.	
3		41	RL185B-6 RING	ROSAN THREADED INSERT BARDWELL-MC ALISTER INC HOLLYWOOD CALIF. CADMIUM PLT. 559A FIN. .0003 THK. & CHROMATE [illegible]
3		40	R1035B-5 INSERT	
6		39	RL215B-6 RING	
6		38	R1045B-6 INSERT	
4		37	RL235B-7 RING	
4		36	R2055B-7 INSERT	
		35		
		34		
		33		
4		30	.112-40x1/4 R.H.B.M.SCR. NIC. PLT. 561A FIN. .0002 THK. CHROM. PLT. 409A FIN. .00002 THK.	
1		28	TERMINAL TUBE SIZE "C" TYPE XXI PER DWG 9-S-5010L BUREAU OF SHIPS-NAVY DEPT	
13		26	TERMINAL #211 #6 HOLE ZIERICK MFG. CO. N.Y.	
		25		
		24		
		23		
1		22	KS15074 RECTIFIER	
1		21	KS15073 LIST 05 ROTARY SOLENOID	
		20		
1	B0-19551	19	WIRING DIAGRAM	
1	B0-53438	18B	LOCAL CABLE	
1	BA 19549	17B	LINK ASSEM.	
1	BR 19547	16B	WAVE GUIDE ASSEM.	
		15		
1	BA 19534	14	STUD	
3	BA 19533	13	GASKET	
1	BL 19532	12	GASKET	
1	BO 19531	11	GASKET	
1	BA 19530	10	ARM	
1	BL 19529	9	COVER	
1	BO 19528	8	COVER	
1	BR 19527	7	HOUSING	
1	SEE TABLE "A"	6	NAMEPLATE	
4	BA 10140-19	5	STUD (SEE NOTE 4)	
8	BA 10140-18	4	STUD (SEE NOTE 4)	
1	ESA 682063-65	3	CAPACITOR	
1	BA 10009-25	2	TERMINAL STRIP	
1	BA 10004-25	1	TERMINAL BLOCK	

STOCK LIST

Figure 28—Wave Guide Switching Unit—Assembly—BR-19552

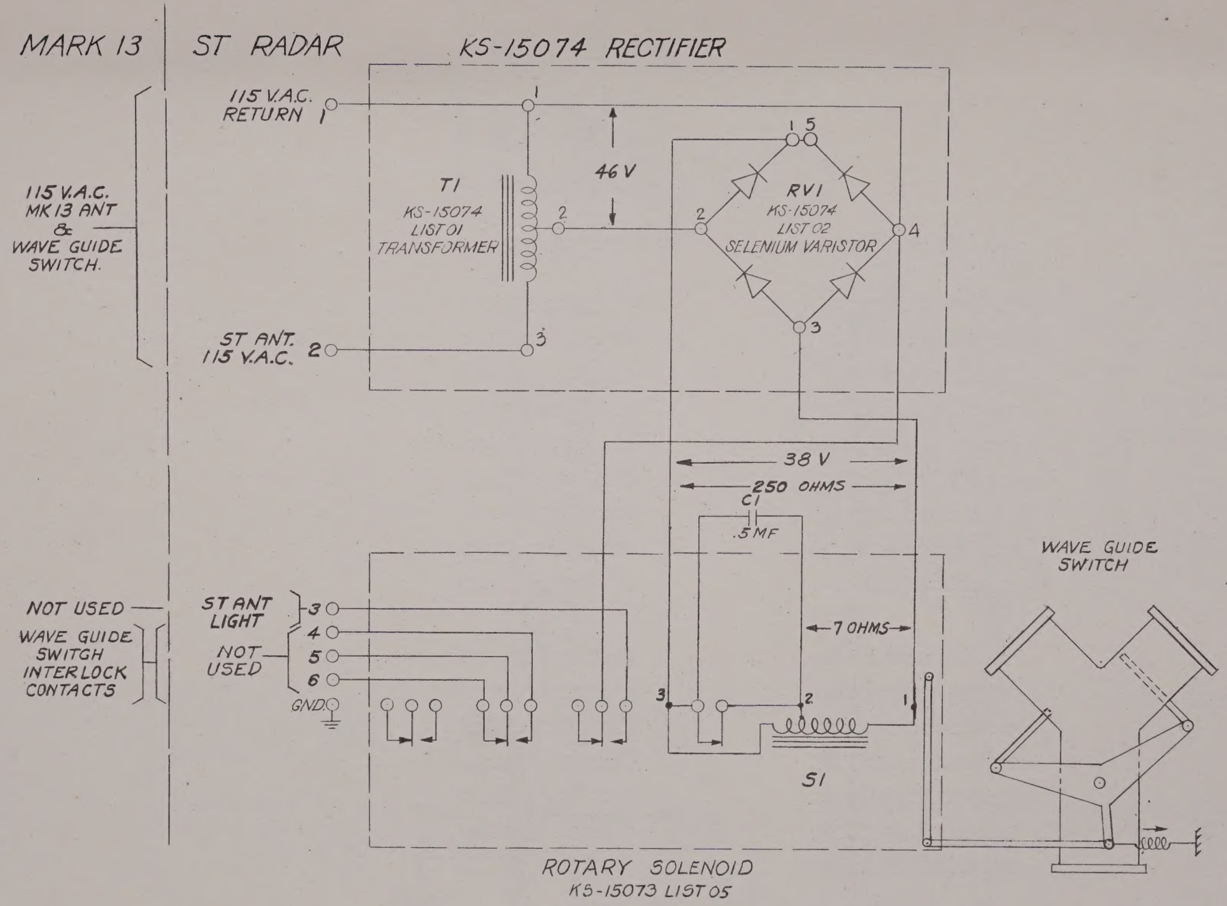

MARK 13
ST RADAR
KS-15074 RECTIFIER
115 V.A.C. RETURN 1
115 V.A.C. MK 13 ANT & WAVE GUIDE SWITCH.
ST ANT. 115 V.A.C. 2
T1
KS-15074
LIST 01
TRANSFORMER
46 V
RV1
KS-15074
LIST 02
SELENIUM VARISTOR
1
2
3
4
5
38 V
250 OHMS
C1
.5 MF
7 OHMS
S1
NOT USED
WAVE GUIDE SWITCH INTERLOCK CONTACTS
ST ANT LIGHT
NOT USED
3
4
5
6
GND.
WAVE GUIDE SWITCH
ROTARY SOLENOID
KS-15073 LIST 05

Figure 29—Wave Guide Switching Unit—Schematic—BL-19550

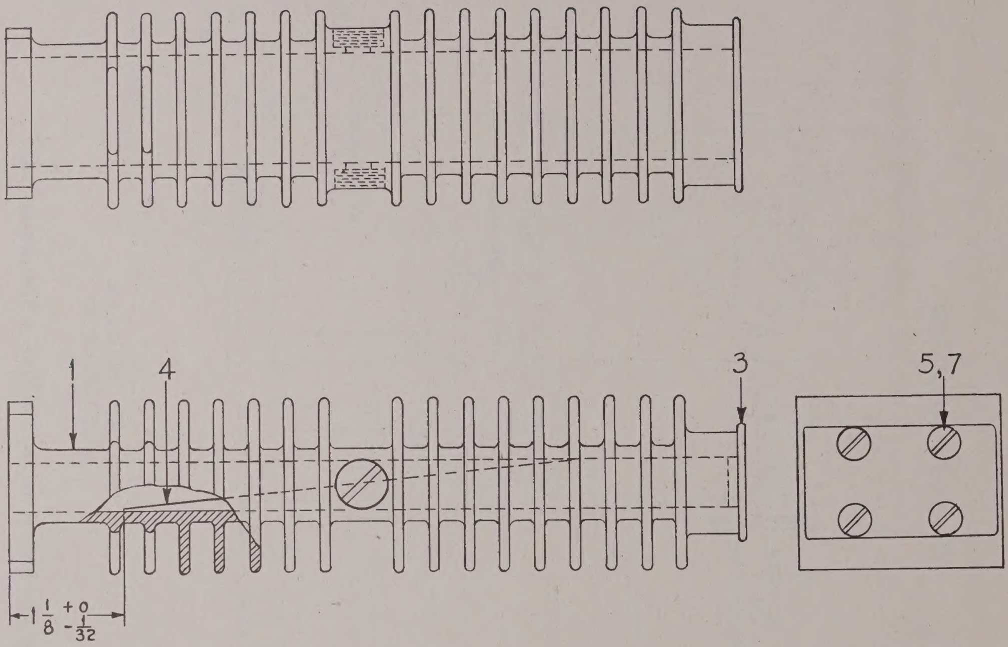
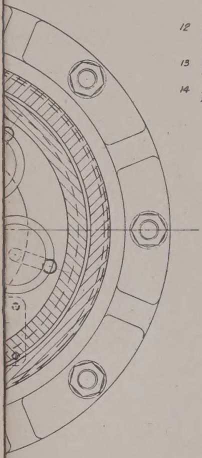

1
4
3
5,7
1 1/8 +0 -1/32

Figure 30—Dummy Antenna—Assembly—BL-409280

NOTES:

1. ITEMS 7 & 24 SHALL BE SOAKED IN A GOOD GRADE OF MACHINE OIL (VISCOSITY APPROX. SAE-30) AND ALL EXCESS OIL SHALL BE REMOVED BEFORE ASSEMBLY.
2. ITEM 49 SHALL BE PACKED WITH, AND THE INTERNAL CYLINDRICAL SURFACES OF ITEM 43 B SHALL BE COATED WITH A THIN FILM OF, "COLONIAL BEACON" - M-285 GREASE.
3. AFTER ASSEMBLY OF ITEM 38B AND BEFORE ASSEMBLY OF ITEM 39B, THE LOCATION OF SURFACE "X" (ITEM 38B) SHALL BE MEASURED WITH RESPECT TO SURFACE "Y" (ITEM 10). ITEM 33 SHALL THEN BE THREADED ON ITEM 39B AND SOLDERED IN SUCH A POSITION THAT DIM. "A" = $1.076^{\pm.002}$ PLUS THE AMOUNT THAT SURFACE "X" IS UNDERFLUSH WITH RESPECT TO "Y" OR LESS THE AMOUNT THAT SURFACE "X" IS OVERFLUSH WITH RESPECT TO "Y".
4. ~~ITEM 59 MAY BE ASSEMBLED 180° FROM POSITION SHOWN. GREASE SUPPLIED WITH COCK SHALL BE REMOVED BEFORE ASSEMBLY.~~
5. ITEMS 101D & 102 D SHALL BE SUPPLIED IN A BAG SECURELY FASTENED TO ITEM 90 BD.
6. ITEM 43B SHALL SLIDE FREELY ON ITEM 44B WITHOUT BINDING AT ANY POINT.
7. LOWER SECTION OF PERISCOPE ADAPTER UNIT SHALL ROTATE FREELY, WITHOUT BINDING IN ANY POSITION, WHEN A ROUND BAR (SIMULATING ITEM 92D) IS PRESSED VERTICALLY AGAINST THE CAM SECTION OF ITEM 41 B.
8. ITEM 40 B SHALL SLIDE FREELY IN ITEM 38B WITHOUT BINDING AT ANY POSITION.
9. *PLACE SMALL QUANTITY OF #1276 G.E. GLYPTAL CEMENT ON THREADS OF ITEM 67 BEFORE TURNING THEM INTO PLACE.*
10. *GASKET, ITEM 16, SHALL BE CEMENTED IN PLACE WITH GOODRICH NO. 169 PLASTIKON OR EQUIVALENT.*
11. *TOP OF ITEM 40B SHALL BE PROTECTED DURING SHIPMENT BY A SUITABLE COVER, SUCH AS DU PONT 48 DIA. X 55 LGTH. RED #4 CEL-O-SEAL CAP.*
12. *WIRE PER NAVY SPEC 22W5 (EQUIVALENT MAT'L SPECS LRM 228 GR-A; WE-58328 GR-A; ASTM B159 GR-A). STRESS RELIEF ANNEAL PER KS-4662.*
13. *THE WORDS "FACT. SER. NO. ------" SHALL BE STEEL STAMPED IN ¼ CHARACTERS. LOCATE APPROX. AS SHOWN.*
14. *ITEM 62 SHALL NOT PROJECT BELOW SURFACE OF BOTTOM PLATE ASSEMBLY (ITEM 41B)*



REQ.	PIECE	ITEM	NAME			
		104				
5		102D	⅝ (.625) × $\frac{1}{32}$ × $\frac{5}{32}$ NON-TANGLING LOCK WASHER		CORR. RES. STEEL	(SEE NOTE 5)
5		101D	⅝-11 × 1½ LG. HEX. H. CAP SCR.			
		100				
8		98D	⅜ (.375) × ⅛ × $\frac{3}{32}$ NON-TANGLING LOCK WASHER			
		97				
8		96D	⅜-24 HEX. NUT			
		95				
8		94D	⅜-24 × 1¾ LG. HEX. H. CAP SCR.			
		93				
1		92D	D-152 279 WAVE GUIDE VALVE			
		91				
1	BO-16542	90BD	ECCENTRIC STOP ASSEM.			
		89				
		88				
		87				
		86				
		85				
		84		NON-TANGLING LOCK WASHER	CORROSION RESISTING STEEL	
12		83	½ (.500) × $\frac{3}{16}$ × ⅛			
		82				
2		81	⅜ (.375) × ⅛ × $\frac{3}{32}$			
		80				
6		79	¼ (.250) × $\frac{5}{64}$ × $\frac{1}{16}$			
9		78	#10 (.190) × $\frac{1}{16}$ × $\frac{3}{64}$			
6		77	#8 (.164) × $\frac{1}{16}$ × $\frac{3}{64}$			
		76				
		75		FIL. H. M. SCR.		
5		74	¼-28 × ⅜ LG.			
1		73	¼-28 × ¾ LG.			
		72				
2		71	.190-32 × ¾ LG.			
		70				
7		69	.190-32 × ½ LG.			
4		68	.164-32 × ½ LG.			
4		67	*.112-40 X ¼ R.H.M.SCR.*			
6		66	HEX. H. CAP SCR.-½-20 × 1½ LG.			
6		65	HEX. H. CAP SCR.-½-20 × 1¼ LG.			
		64				
1		*62*	*⅛ NPT-PIPE PLUG-BRASS-SLOTTED HD. MAY BE OBTAINED FROM ELCO TOOL & SCREW CORP. ROCKFORD, ILL.*			
~~AS REQ.~~		61	*.041 PHOS. BR. WIRE-SOFT TEMPER (SEE NOTE 12)*			
~~1~~		59	~~FIG. 178 ⅛ IN. PIPE THD. GROUND KEY COCK THE LUNKENHEIMER CO., CINCINNATI, O.~~			
1		55	#50364 SEAL NATIONAL MOTOR BEARING CO., INC. REDWOOD CITY, CAL. OR #5 'KLOZURE' THE GARLOCK PACKING CO. PALMYRA, N.Y.			
1		51	#50120 SEAL NATIONAL MOTOR BEARING CO. INC. REDWOOD CITY, CAL. OR #287 'KLOZURE' THE GARLOCK PACKING CO. PALMYRA, N.Y.			
1		49	3L24 BEARING GENERAL MOTORS CORP. NEW DEPARTURE DIV. BRISTOL, CONN. (SEE NOTE 2)			
1	*BR-28803-42*	48	*NAMEPLATE*			
		47				
1	BA-19159	46B	CAP ASSEM.			
1	BL-19003	45B	PLUNGER ASSEM.			
1	BO-18446	44B	INNER SHELL ASSEM.			
1	BR-18443	43B	OUTER SHELL ASSEM. (SEE NOTE 2)			
		42				
1	BX-16499	41B	BOTTOM PLATE ASSEM.			
1	BR-16481	40B	INNER TUBE ASSEM.			
1	BO-16480	39B	LOWER ROTARY JOINT ASSEM.			
1	BR-16471	38B	UPPER ROTARY JOINT ASSEM.			
1		*36*	*#1932 ALEMITE GREASE FITTING-OBTAIN FROM STEWART-WARNER INC.-CHICAGO-ALEMITE DIVISION*			
1	BA-19162	35	PLATE			
		34				
1	BA-19071	33	BALL			
		32				
1	BL-19024	31	COVER PLATE			
1	BA-19002	30	WASHER			
		29				
		28				
2	BA-18480	27	SCREW			
1	BA-18479	26	CAP			
		25				
2	BA-18477	24	GASKET (SEE NOTE 1)			
4	BA-18476	23	GASKET RETAINER			
		22				
		21				
		20				
		19				
4	BL-18453	18	SPRING			
2	BA-18451	17	GUIDE SCREW			
1	BA-18450	16	GASKET			
1	BL-18449	15	RING			
1	BL-21813	14	STOP RING			
		13				
		12				
1	BO-16537	11	COVER			
1	BR-16526	10	BEARING HOUSING			
2	BL-16525	9	RING			
		8				
2	BL-16508	7	RING (SEE NOTE 1)			
		6				
1	BA-16490	5	YOKE			
		4				
		3				
		2				
		1				

STOCK LIST

D-152273

SUPPLEMENTARY DRAWINGS

A-INDIVIDUAL PARTS
B-PARTIAL ASSEMBLIES } NEEDED BY ASSEMBLY DEPT.
D-PARTS SHIPPED LOOSE

NOTE
ITEMS NOT SPECIFIED AS "B" OR "D" PARTS IN ITEM COLUMN ARE "A" PARTS

DIMENSIONS UP TO AND [illegible] INCHES EXPRESSED IN INCHES NON-LIMITED DIMENSIONS [illegible] SIZE OF RAW MATERIAL SHALL BE HELD WITHIN [illegible]

B 16470

Figure 31—Periscope Adapter—Assembly—BXX–16470

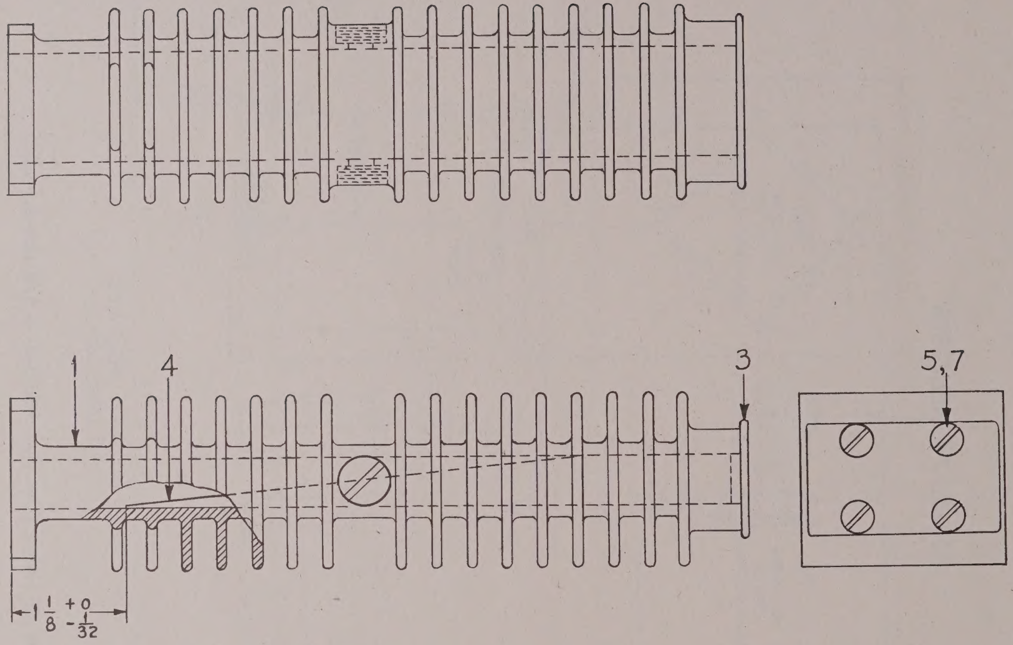
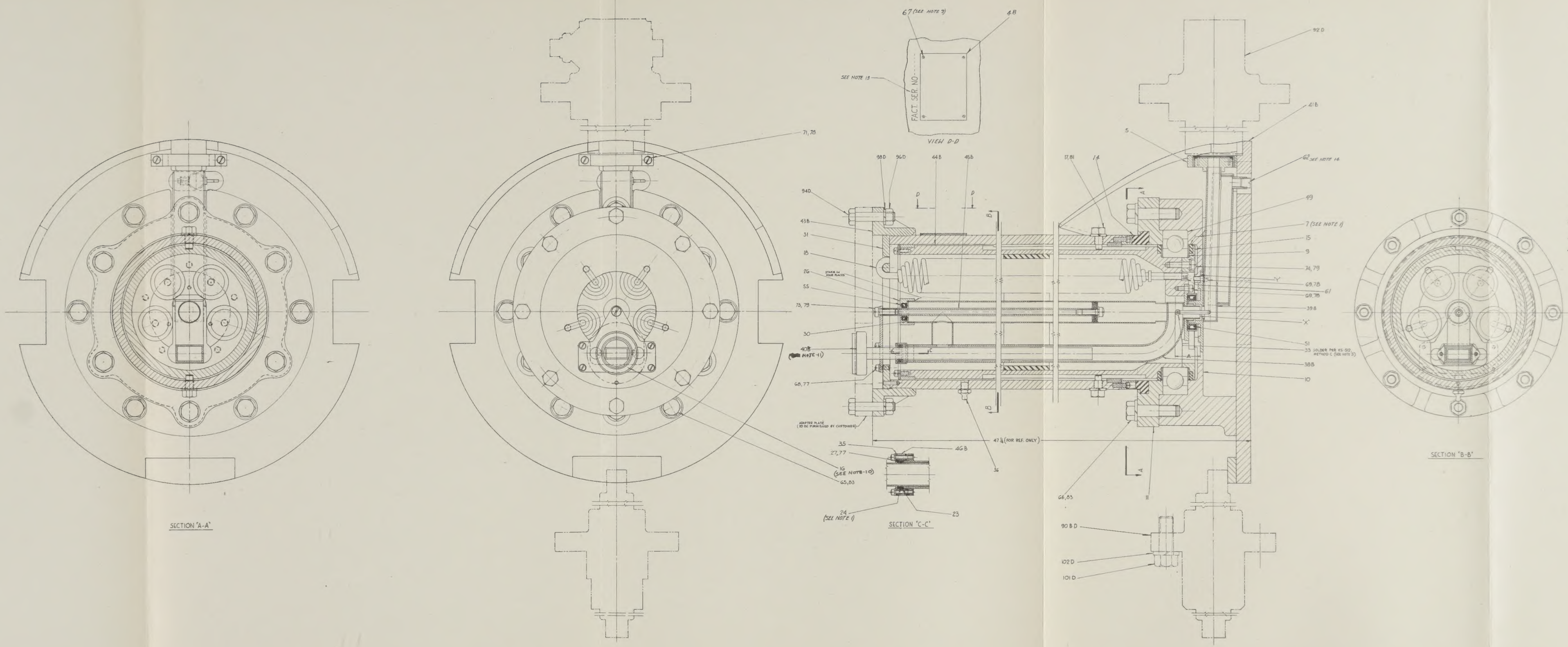

1
4
3
5,7
1 1/8 +0 -1/32

Figure 30—Dummy Antenna—Assembly—BL-409280



NOTES:

1. ITEMS 7 & 24 SHALL BE SOAKED IN A GOOD GRADE OF MACHINE OIL (VISCOSITY APPROX. SAE-30) AND ALL EXCESS OIL SHALL BE REMOVED BEFORE ASSEMBLY.
2. ITEM 49 SHALL BE PACKED WITH, AND THE INTERNAL CYLINDRICAL SURFACES OF ITEM 43B SHALL BE COATED WITH A THIN FILM OF "COLONIAL BEACON"-M/285 GREASE.
3. AFTER ASSEMBLY OF ITEM 38B AND BEFORE ASSEMBLY OF ITEM 39B, THE LOCATION OF SURFACE "X" (ITEM 38B) SHALL BE MEASURED WITH RESPECT TO SURFACE "Y" (ITEM 10). ITEM 33 SHALL THEN BE THREADED ON ITEM 39B AND SOLDERED IN SUCH A POSITION THAT DIM. "A" = 1.076 ±.002 PLUS THE AMOUNT THAT SURFACE "X" IS UNDERFLUSH WITH RESPECT TO "Y" OR LESS THE AMOUNT THAT SURFACE "X" IS OVERFLUSH WITH RESPECT TO "Y".
4. ~~ITEM 59 MAY BE ASSEMBLED 180° FROM POSITION SHOWN. GREASE SUPPLIED WITH LOCK SHALL BE REMOVED BEFORE ASSEMBLY.~~
5. ITEMS 101D & 102D SHALL BE SUPPLIED IN A BAG SECURELY FASTENED TO ITEM 90BD.
6. ITEM 43B SHALL SLIDE FREELY ON ITEM 44B WITHOUT BINDING AT ANY POINT.
7. LOWER SECTION OF PERISCOPE ADAPTER UNIT SHALL ROTATE FREELY, WITHOUT BINDING IN ANY POSITION, WHEN A ROUND BAR (SIMULATING ITEM 92D) IS PRESSED VERTICALLY AGAINST THE CAM SECTION OF ITEM 41B.
8. ITEM 40B SHALL SLIDE FREELY IN ITEM 38B WITHOUT BINDING AT ANY POSITION.
9. PLACE SMALL QUANTITY OF #1276 G.E. GLYPTAL CEMENT ON THREADS OF ITEM 67 BEFORE TURNING THEM INTO PLACE.
10. GASKET, ITEM 16, SHALL BE CEMENTED IN PLACE WITH GOODRICH NO. 169 PLASTIKON OR EQUIVALENT.
11. TOP OF ITEM 40B SHALL BE PROTECTED DURING SHIPMENT BY A SUITABLE COVER, SUCH AS DU PONT 48 DIA. X 55 LGTH. RED #4 CEL-O-SEAL CAP.
12. WIRE PER NAVY SPEC. 22W5 (EQUIVALENT MAT'L SPECS. URM 228 GR-A, WE-58328 GR-A, ASTM B159 GR-A) STRESS RELIEF ANNEAL PER XS-4662.
13. THE WORDS "FACT. SER. NO. ------" SHALL BE STEEL STAMPED IN 1/8 CHARACTERS. LOCATE APPROX. AS SHOWN.
14. ITEM 62 SHALL NOT PROJECT BELOW SURFACE OF BOTTOM PLATE ASSEMBLY (ITEM 41B)

REQ.	PIECE	ITEM	NAME		
		104			
5		102D	5/8 (.625) × 3/32 × 5/32 NON-TANGLING LOCK WASHER	CORR. RES. STEEL	(SEE NOTE 5)
5		101D	5/8-11 × 1 1/2 LG. HEX. H. CAP SCR.		
		100			
8		98D	3/8 (.375) × 1/8 × 3/32 NON-TANGLING LOCK WASHER		
		97			
8		96D	3/8-24 HEX. NUT		
		95			
8		94D	3/8-24 × 1 1/4 LG. HEX. H. CAP SCR.		
		93			
1		92D	D152273 WAVE GUIDE VALVE		
		91			
1	BO-16542	90BD	ECCENTRIC STOP ASSEM.		
		89			
		88			
		87			
		86			
		85			
		84		NON-TANGLING LOCK WASHER	CORROSION RESISTING STEEL
12		83	1/2 (.500) × 1/16 × 1/8		
		82			
2		81	3/8 (.375) × 1/8 × 3/32		
		80			
6		79	1/4 (.250) × 5/64 × 1/16		
9		78	#10 (.190) × 1/16 × 3/64		
6		77	#8 (.164) × 1/16 × 3/64		
		76			
		75		FIL. H. M. SCR.	
5		74	1/4-28 × 7/8 LG.		
1		73	1/4-28 × 3/8 LG.		
		72			
2		71	.190-32 × 3/8 LG.		
		70			
7		69	.190-32 × 1/2 LG.		
4		68	.164-32 × 1/2 LG.		
4		67	.112-40 × 1/8 R.H.M. SCR.		
6		66	HEX. H. CAP SCR. 1/4-20 × 1 1/2 LG.		
6		65	HEX. H. CAP SCR. 1/4-20 × 1 1/4 LG.		
		64			
1		62	1/8 NPT - PIPE PLUG - BRASS - SLOTTED HD. MAY BE OBTAINED FROM ILLS. TOOL & SCREW CORP. ROCKFORD, ILL.		
[illegible]		61	.041 PHOS. BR. WIRE-SOFT TEMPER (SEE NOTE 12)		
1		59	~~[illegible]~~		
1		55	#50564 SEAL NATIONAL MOTOR BEARING CO., INC. REDWOOD CITY, CAL. or #5 "KLOZURE" THE GARLOCK PACKING CO. PALMYRA, N.Y.		
1		51	#50120 SEAL NATIONAL MOTOR BEARING CO. INC. REDWOOD CITY, CAL. or #287 "KLOZURE" THE GARLOCK PACKING CO. PALMYRA, N.Y.		
1		49	3L24 BEARING GENERAL MOTORS CORP. (SEE NOTE 2) NEW DEPARTURE DIV. BRISTOL, CONN.		
1	BR-28803-42	48	NAMEPLATE		
		47			
1	BA-19159	46B	CAP ASSEM.		
1	BL-19003	45B	PLUNGER ASSEM.		
1	BO-18446	44B	INNER SHELL ASSEM.		
1	BR-18445	43B	OUTER SHELL ASSEM. (SEE NOTE 2)		
		42			
1	BX-16499	41B	BOTTOM PLATE ASSEM.		
1	BR-16481	40B	INNER TUBE ASSEM.		
1	BO-16480	39B	LOWER ROTARY JOINT ASSEM.		
1	BR-16471	38B	UPPER ROTARY JOINT ASSEM.		
1		36	#1330 ALEMITE GREASE FITTING OBTAIN FROM STEWART-WARNER INC.-CHICAGO-ALEMITE DIVISION		
1	BA-19162	35	PLATE		
		34			
1	BA-19071	33	BALL		
		32			
1	BL-19024	31	COVER PLATE		
1	BA-19002	30	WASHER		
		29			
		28			
2	BA-18480	27	SCREW		
1	BA-18479	26	CAP		
		25			
2	BA-18477	24	GASKET (SEE NOTE 1)		
4	BA-18476	23	GASKET RETAINER		
		22			
		21			
		20			
		19			
4	BL-18463	18	SPRING		
2	BA-18451	17	GUIDE SCREW		
1	BA-18450	16	GASKET		
1	BL-18449	15	RING		
1	BL-21813	14	STOP RING		
		13			
		12			
1	BO-16587	11	COVER		
1	BR-16526	10	BEARING HOUSING		
2	BL-16525	9	RING		
		8			
2	BL-16508	7	RING (SEE NOTE 1)		
		6			
1	BA-16490	5	YOKE		
		4			
		3			
		2			
		1			

STOCK LIST

D-152273

SUPPLEMENTARY DRAWINGS

B 16470

Figure 31—Periscope Adapter—Assembly—BXX-16470

Figure 32—Wave Guide Valve—Assembly—BX-16504

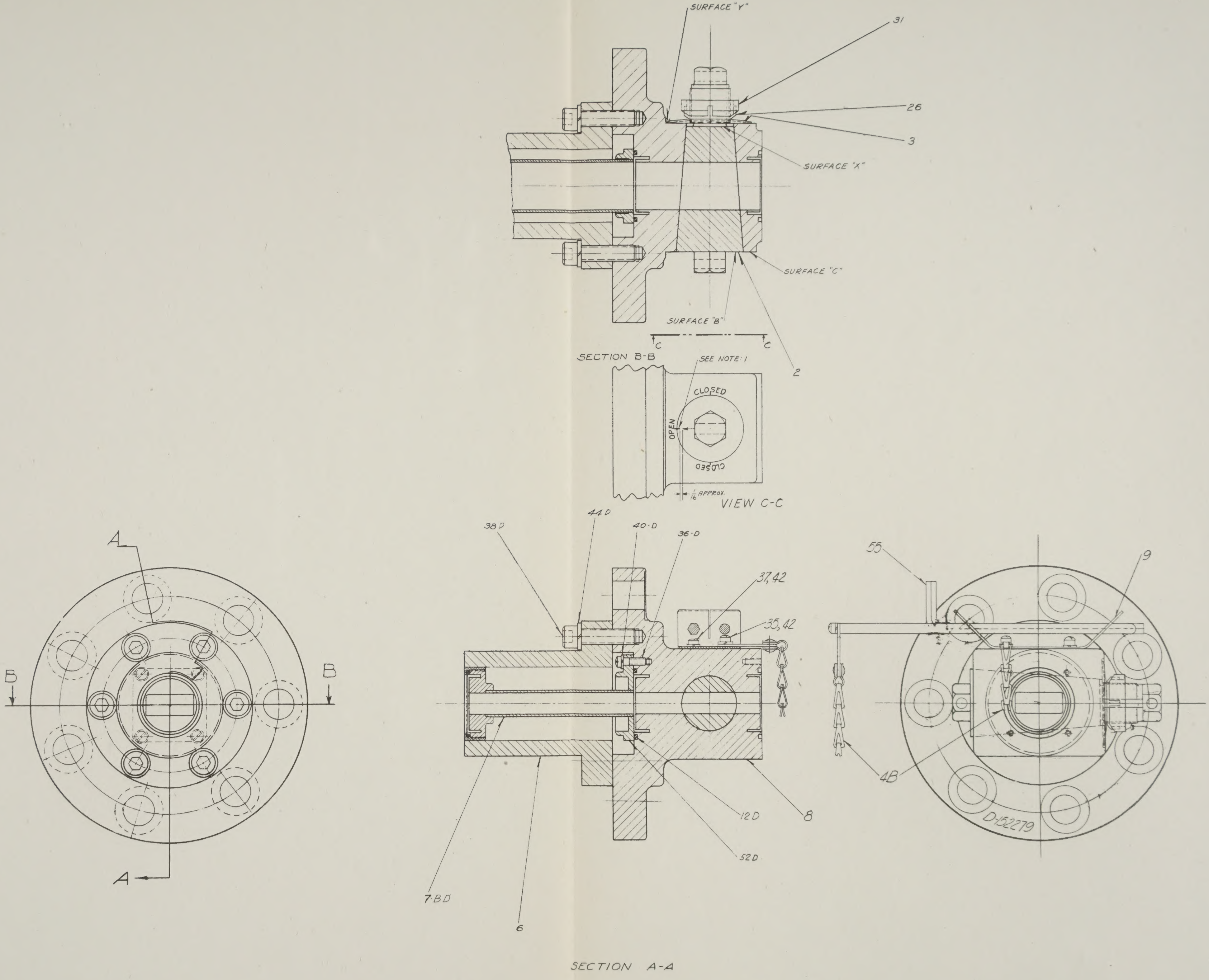
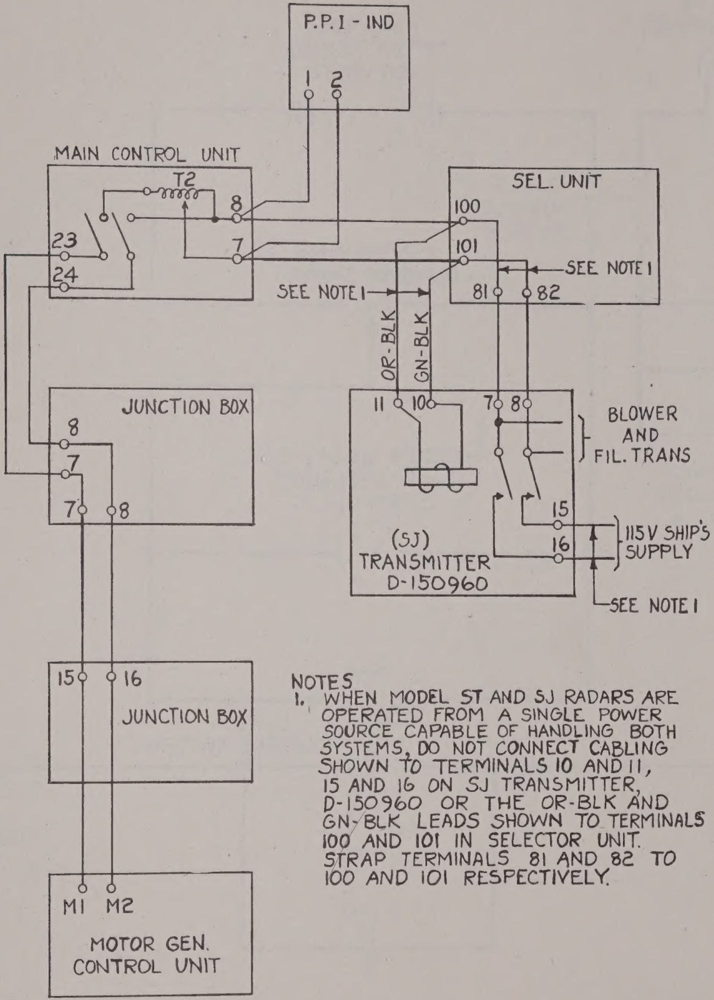

SURFACE "Y"
31
26
3
SURFACE "X"
SURFACE "C"
SURFACE "B"
C
C
SECTION B-B
SEE NOTE: 1
2
CLOSED
OPEN
CLOSED
1/16 APPROX.
VIEW C-C
A
B
B
A
38 D
44 D
40-D
36-D
37,42
35,42
55
9
4B
12 D
8
52 D
7BD
6
D-152279
SECTION A-A

Figure 32—Wave Guide Valve—Assembly—BX-16504


P.P.I - IND
1
2
MAIN CONTROL UNIT
T2
8
7
23
24
SEL. UNIT
100
101
SEE NOTE 1
81
82
SEE NOTE 1
OR-BLK
GN-BLK
JUNCTION BOX
8
7
7
8
11
10
7
8
BLOWER AND FIL. TRANS
15
16
115 V SHIP'S SUPPLY
(SJ) TRANSMITTER D-150960
SEE NOTE 1
15
16
JUNCTION BOX
M1
M2
MOTOR GEN. CONTROL UNIT

NOTES
1. WHEN MODEL ST AND SJ RADARS ARE OPERATED FROM A SINGLE POWER SOURCE CAPABLE OF HANDLING BOTH SYSTEMS, DO NOT CONNECT CABLING SHOWN TO TERMINALS 10 AND 11, 15 AND 16 ON SJ TRANSMITTER, D-150960 OR THE OR-BLK AND GN-BLK LEADS SHOWN TO TERMINALS 100 AND 101 IN SELECTOR UNIT. STRAP TERMINALS 81 AND 82 TO 100 AND 101 RESPECTIVELY.

Figure 33—115 Volt Distribution Circuit—ESL-990890

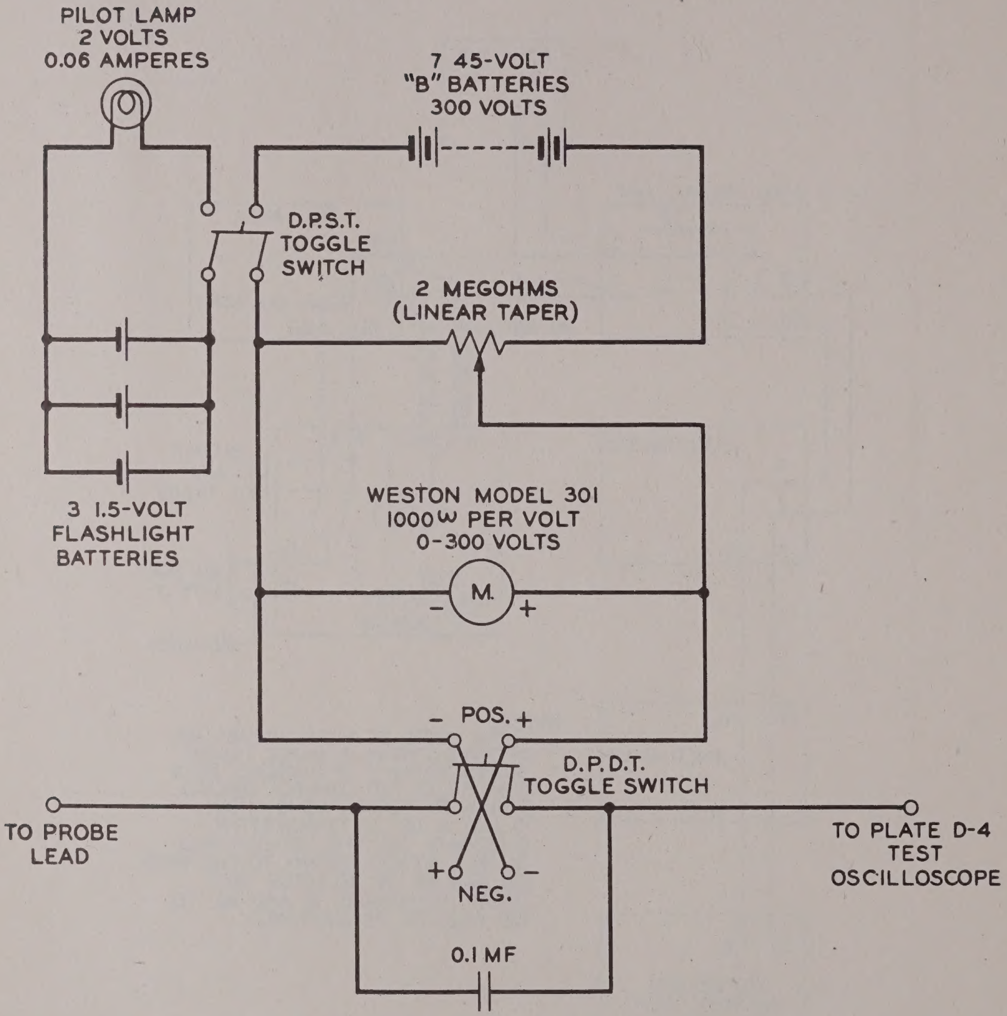

PILOT LAMP
2 VOLTS
0.06 AMPERES
7 45-VOLT
"B" BATTERIES
300 VOLTS
D.P.S.T.
TOGGLE
SWITCH
2 MEGOHMS
(LINEAR TAPER)
3 1.5-VOLT
FLASHLIGHT
BATTERIES
WESTON MODEL 301
1000ω PER VOLT
0-300 VOLTS
M.
−
+
− POS. +
D.P.D.T.
TOGGLE SWITCH
TO PROBE
LEAD
TO PLATE D-4
TEST
OSCILLOSCOPE
+
−
NEG.
0.1 MF

Figure 34—Volt Box for Measuring Voltages of Wave Forms—ESL–822789

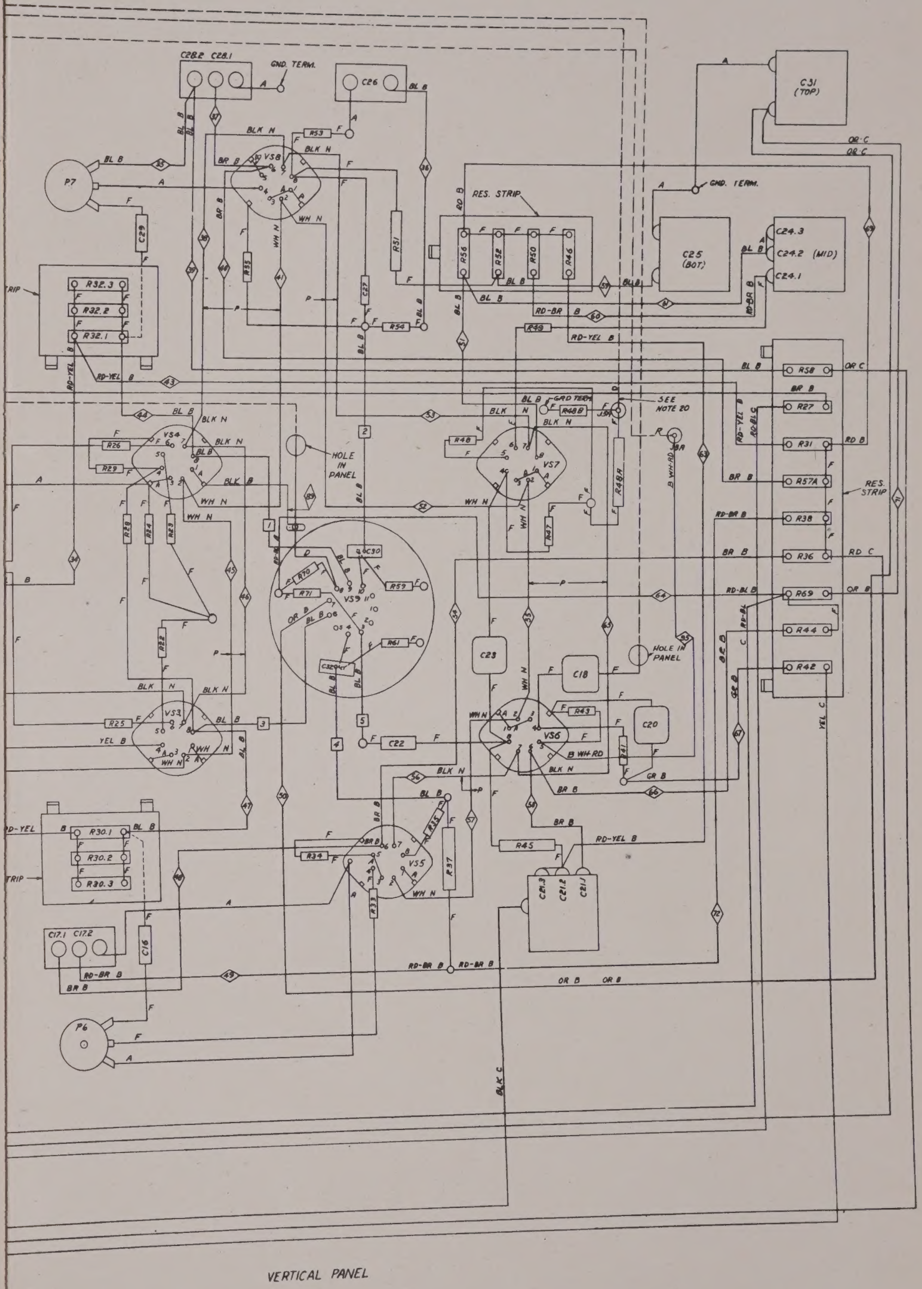

C28.2
C28.1
GND. TERM.
C26
C31 (TOP)
P7
VS8
R53
R51
R55
C27
R54
C29
R32.3
R32.2
R32.1
STRIP
RES. STRIP
R56
R52
R50
R46
C25 (BOT.)
C24.3
C24.2 (MID)
C24.1
R49
R58
R27
R31
R57A
R38
R36
R69
R44
R42
RES. STRIP
VS4
R26
R29
R28
R24
R23
R22
HOLE IN PANEL
VS9
C30
R70
R71
R59
R61
C32
GRD TERM.
R48B
R48
VS7
R48A
R47
SEE NOTE 20
J51
C23
C18
C20
VS6
R43
R41
HOLE IN PANEL
VS3
R25
C22
VS5
R34
R35
R37
R33
R45
C21.3
C21.2
C21.1
R30.1
R30.2
R30.3
C17.1
C17.2
C16
P6
VERTICAL PANEL

Figure 35—Indicator—Wiring Diagram—ESXX–990852

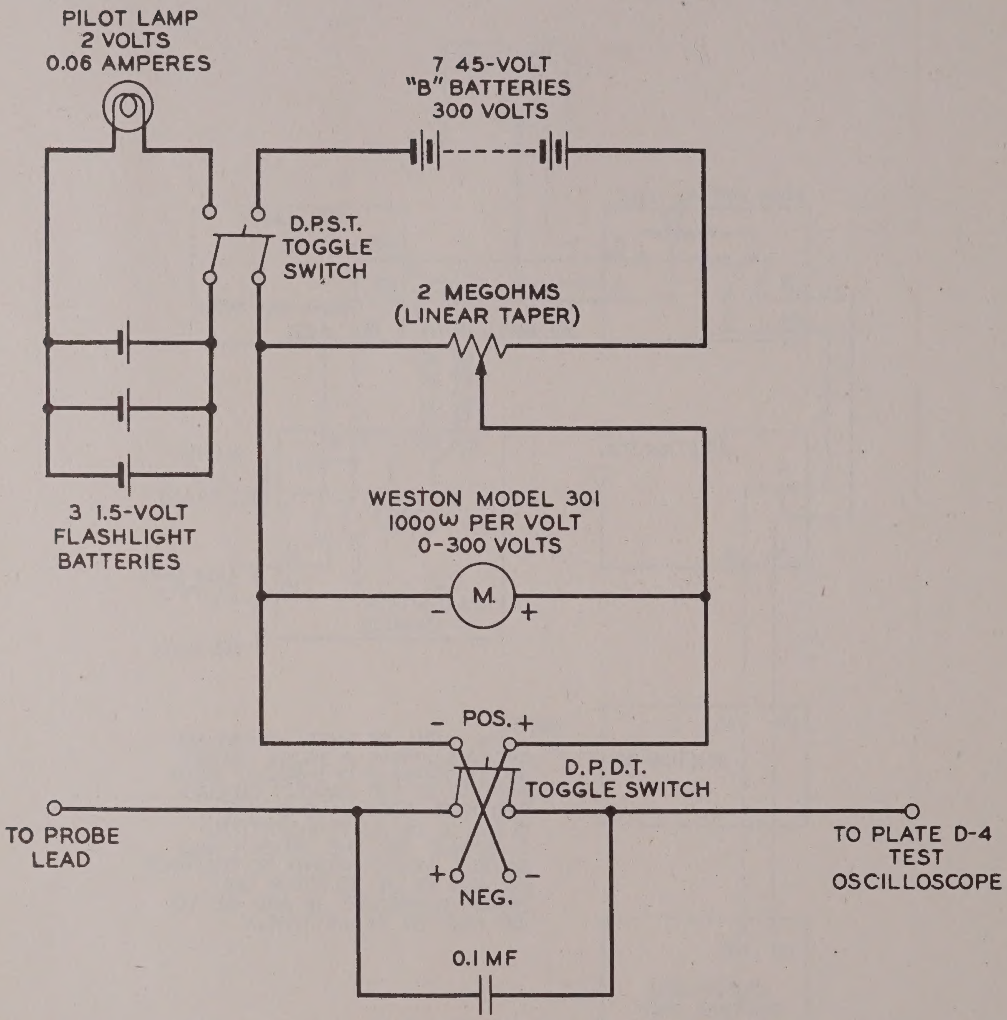

PILOT LAMP
2 VOLTS
0.06 AMPERES
7 45-VOLT
"B" BATTERIES
300 VOLTS
D.P.S.T.
TOGGLE
SWITCH
2 MEGOHMS
(LINEAR TAPER)
3 1.5-VOLT
FLASHLIGHT
BATTERIES
WESTON MODEL 301
1000ω PER VOLT
0-300 VOLTS
M.
–
+
– POS. +
D.P.D.T.
TOGGLE SWITCH
TO PROBE
LEAD
TO PLATE D-4
TEST
OSCILLOSCOPE
+
–
NEG.
0.1 MF

Figure 34—Volt Box for Measuring Voltages of Wave Forms—ESL–822789

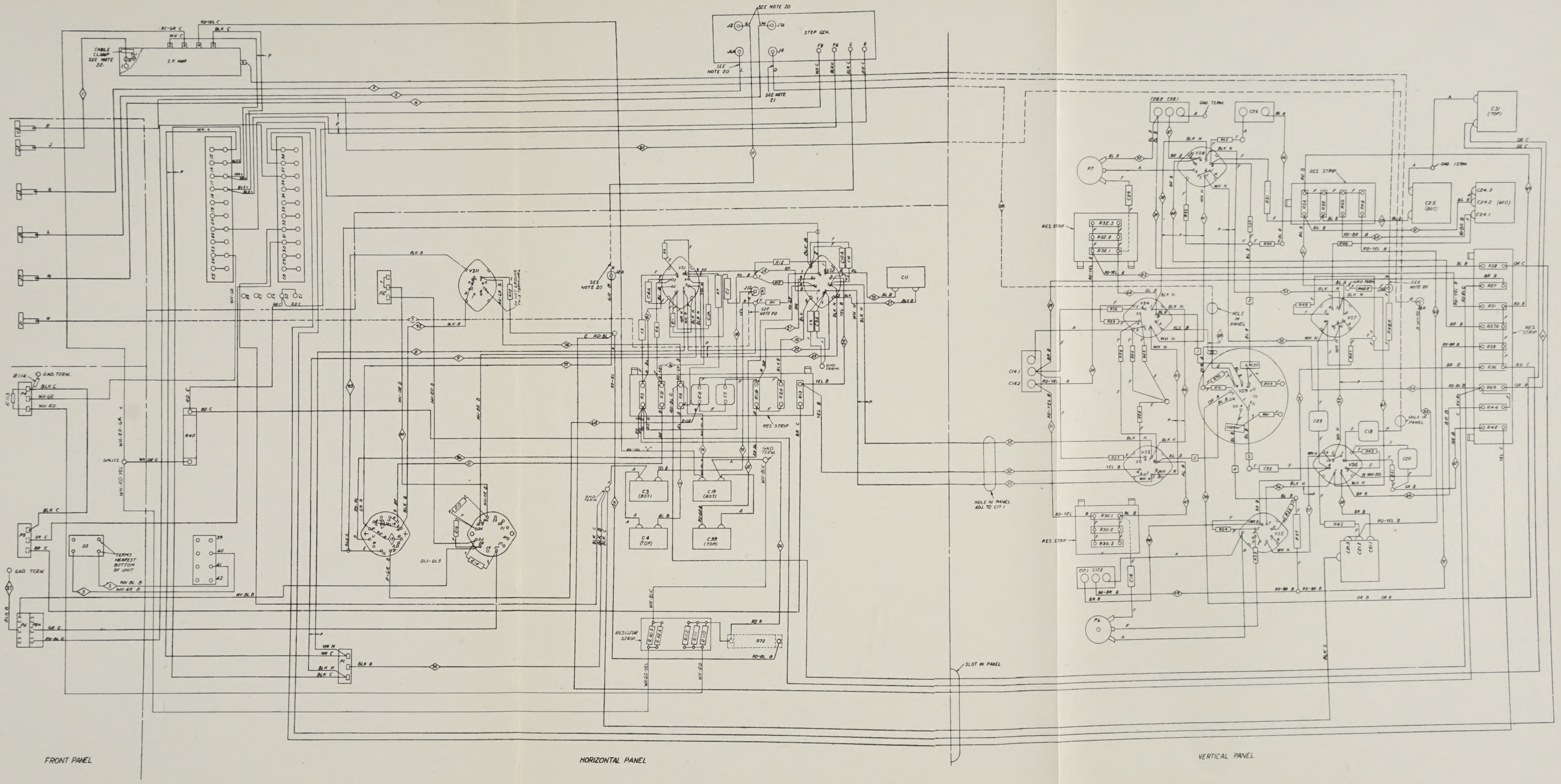

SEE NOTE 20
STEP GEN.
SEE NOTE 21
I.F. AMP
CABLE CLAMP SEE NOTE 22
GND. TERM.
SPLICE
TERMS NEAREST BOTTOM OF UNIT
RESISTOR STRIP
RES. STRIP
HOLE IN PANEL ADJ TO C17.1
SLOT IN PANEL
HOLE IN PANEL
FRONT PANEL
HORIZONTAL PANEL
VERTICAL PANEL

Figure 35—Indicator—Wiring Diagram—ESXX-990852

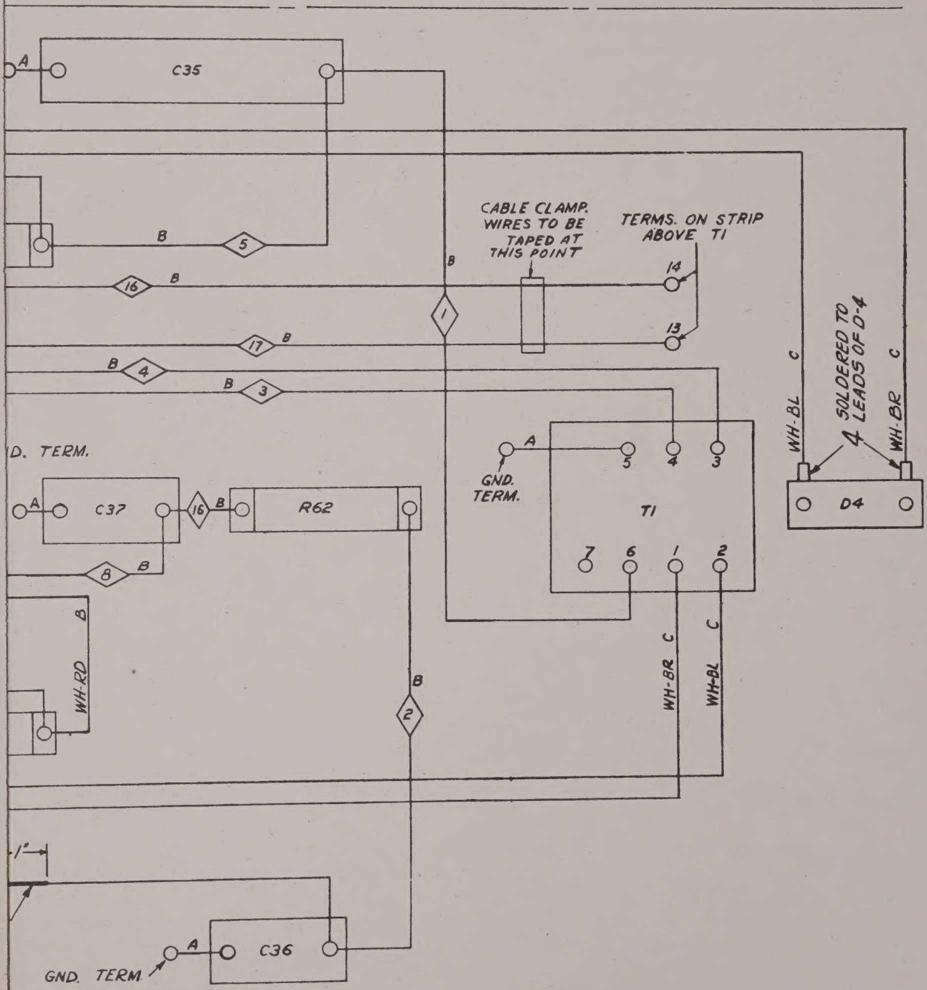

A
C35
B
5
CABLE CLAMP. WIRES TO BE TAPED AT THIS POINT
TERMS. ON STRIP ABOVE T1
B
16
B
14
1
17
B
13
B
4
B
3
C
WH-BL
SOLDERED TO LEADS OF D-4
4
C
WH-BR
D4
D. TERM.
A
GND. TERM.
5
4
3
T1
A
C37
16
B
R62
8
B
7
6
1
2
B
WH-RD
C
WH-BR
C
WH-BL
B
2
1"
A
C36
GND. TERM.

Figure 36—Indicator Power Supply—Wiring Diagram—ESR-990851

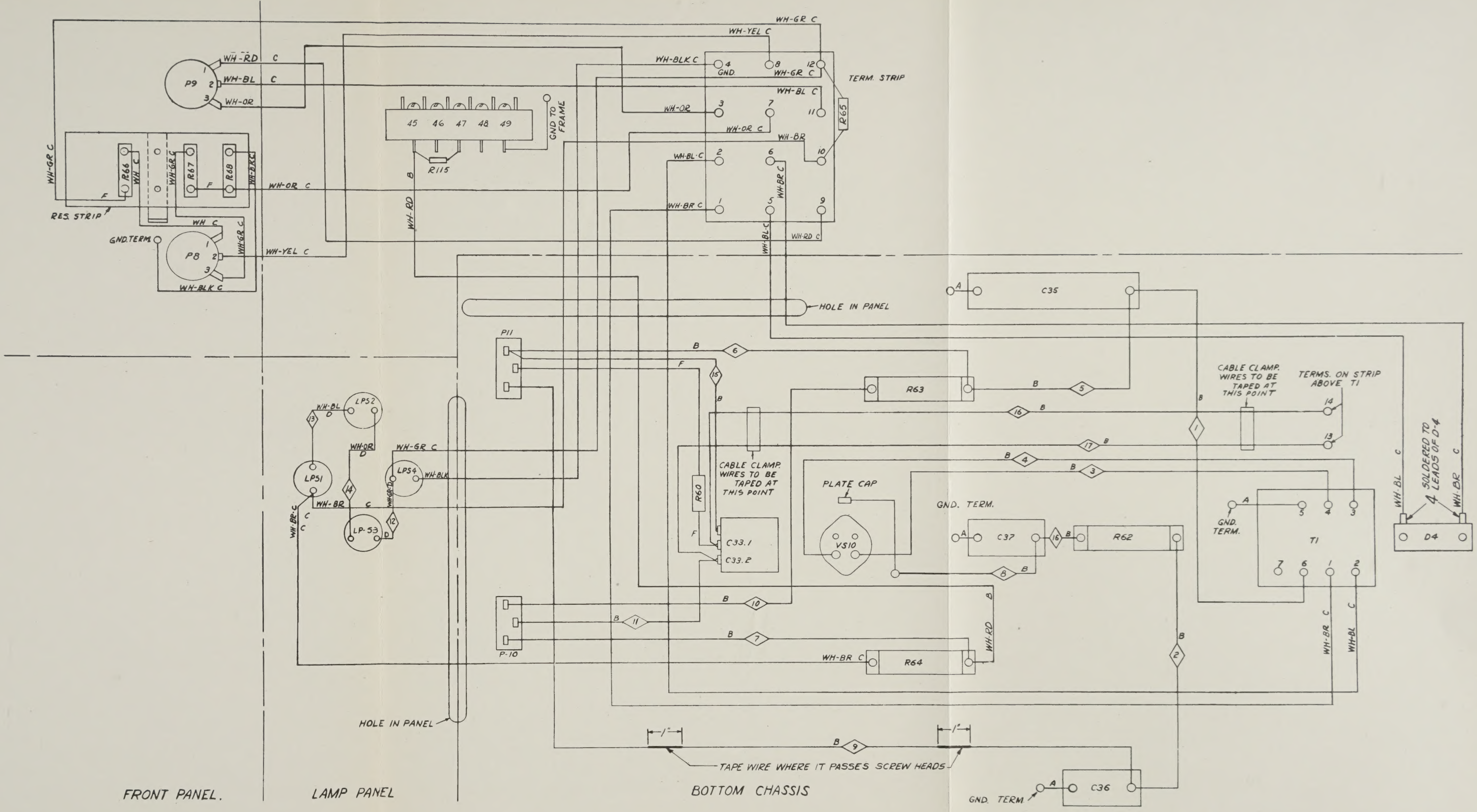

P9
WH-RD C
WH-BL C
WH-OR
RES. STRIP
R66
R67
R68
WH C
WH-GR C
WH-BRK C
WH-OR C
GND. TERM.
P8
WH-YEL C
WH-BLK C
45 46 47 48 49
GND TO FRAME
R115
WH-RD
WH-GR C
WH-YEL C
WH-BLK C
4 GND.
8
12
WH-GR C
TERM. STRIP
WH-BL C
WH-OR
3
7
11
R65
WH-OR C
WH-BR
10
WH-BL C
2
6
WH-BR C
1
5
9
WH-BL C
WH-RD C
C35
HOLE IN PANEL
P11
LPS2
LPS1
LPS4
LP-S3
WH-BL
WH-OR
WH-GR C
WH-BLK
WH-BR
WH-BR-C
R63
R60
CABLE CLAMP. WIRES TO BE TAPED AT THIS POINT
C33.1
C33.2
PLATE CAP
VS10
GND. TERM.
C37
R62
CABLE CLAMP. WIRES TO BE TAPED AT THIS POINT
TERMS. ON STRIP ABOVE T1
14
13
T1
GND. TERM.
5 4 3
7 6 1 2
SOLDERED TO 4 LEADS OF D-4
WH-BL C
WH-BR C
D4
P-10
R64
WH-BR C
WH-RD
WH-BR C
WH-BL C
HOLE IN PANEL
1"
1"
TAPE WIRE WHERE IT PASSES SCREW HEADS
GND. TERM
C36
FRONT PANEL.
LAMP PANEL
BOTTOM CHASSIS

Figure 36—Indicator Power Supply—Wiring Diagram—ESR-990851

Figure 37—Selector Unit—Wiring Diagram—BR–18503

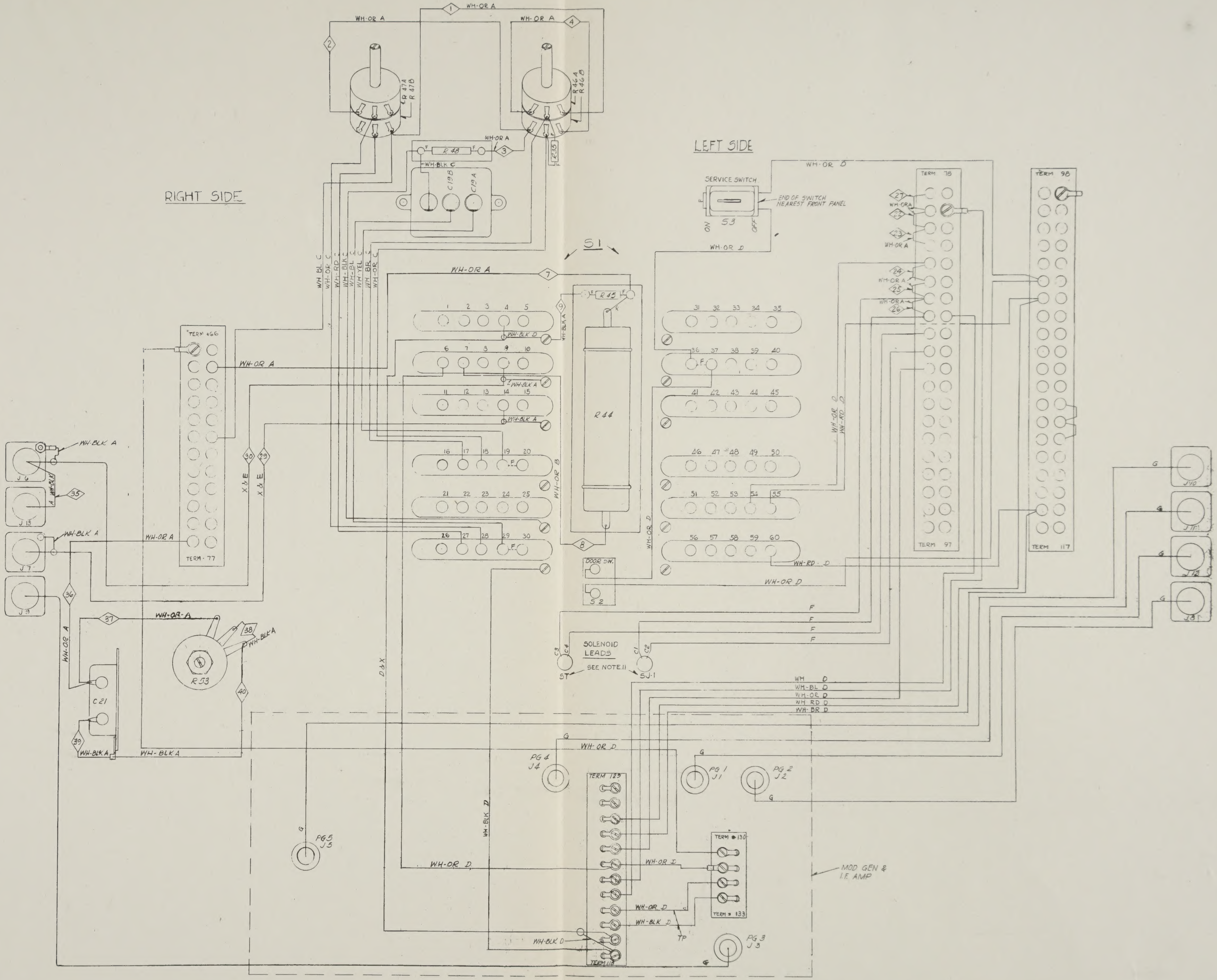

RIGHT SIDE
LEFT SIDE
WH-OR A
R 47A
R 47B
R 46A
R 46B
R 48
R 35
WH-BLK C
C 19B
C 19A
S1
SERVICE SWITCH
END OF SWITCH NEAREST FRONT PANEL
S3
ON
OFF
WH-OR D
TERM 78
TERM 97
TERM 98
TERM 117
TERM 466
TERM 77
R 45
R 44
WH-BLK A
WH-BLK D
WH-OR B
WH-BL C
WH-OR C
WH-RD C
WH-BLK C
WH-BL C
WH-YEL C
WH-BR C
X & E
J 6
J 15
J 7
J 8
C 21
R 53
DOOR SW.
S 2
SOLENOID LEADS
SEE NOTE 11
ST
SJ-1
WH-RD D
WH D
WH-BL D
WH-OR D
WH RD D
WH-BR D
J 40
J 17
J 12
J 31
PG 4 J 4
PG 1 J 1
PG 2 J 2
PG 3 J 3
PG 5 J 5
TERM 125
TERM 130
TERM 133
TERM 118
TP
D & X
WH-BLK D
MOD GEN & I.F. AMP
G
F

Figure 37—Selector Unit—Wiring Diagram—BR–18503

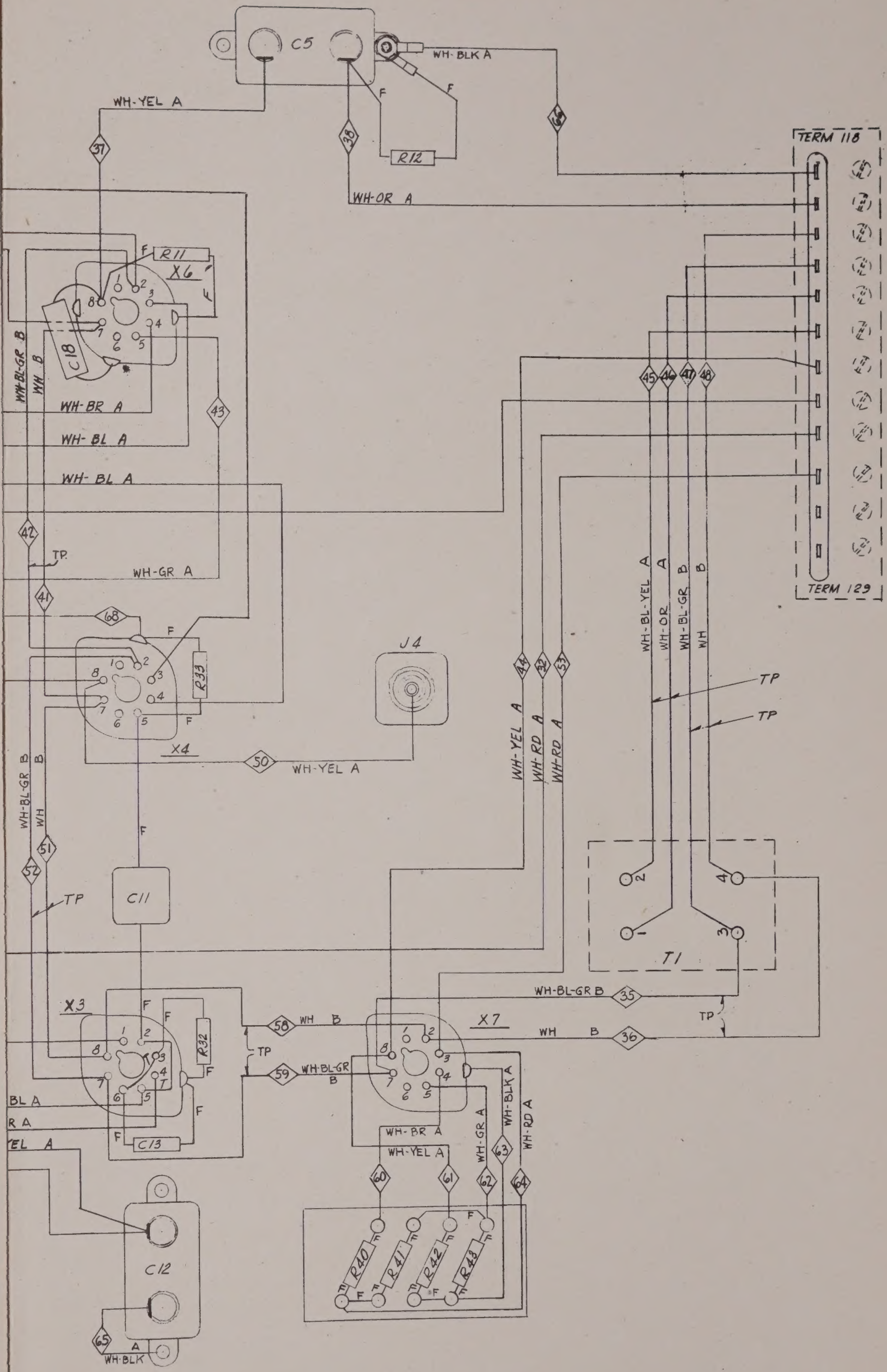

C5
WH-BLK A
F
F
WH-YEL A
37
38
66
R12
WH-OR A
TERM 118
TERM 129
R11
X6
F
1
2
3
4
5
6
7
8
C18
WH-BL-GR B
WH B
WH-BR A
WH-BL A
WH-BL A
43
45
46
47
48
42
TP
WH-GR A
41
68
F
R33
X4
J4
50
WH-YEL A
WH-BL-YEL A
WH-OR A
WH-BL-GR B
WH B
TP
TP
44
32
53
WH-YEL A
WH-RD A
WH-RD A
WH-BL-GR B
WH B
51
52
TP
F
C11
T1
35
WH-BL-GR B
36
WH B
TP
X3
F
F
R32
TP
58
WH B
59
WH-BL-GR B
X7
BL A
R A
YEL A
C13
T
WH-BR A
WH-YEL A
WH-GR A
WH-BLK A
WH-RD A
60
61
62
63
64
R40
R41
R42
R43
F
C12
65
A
WH-BLK

Figure 38—Modulation Generator—Wiring Diagram—BR-18395

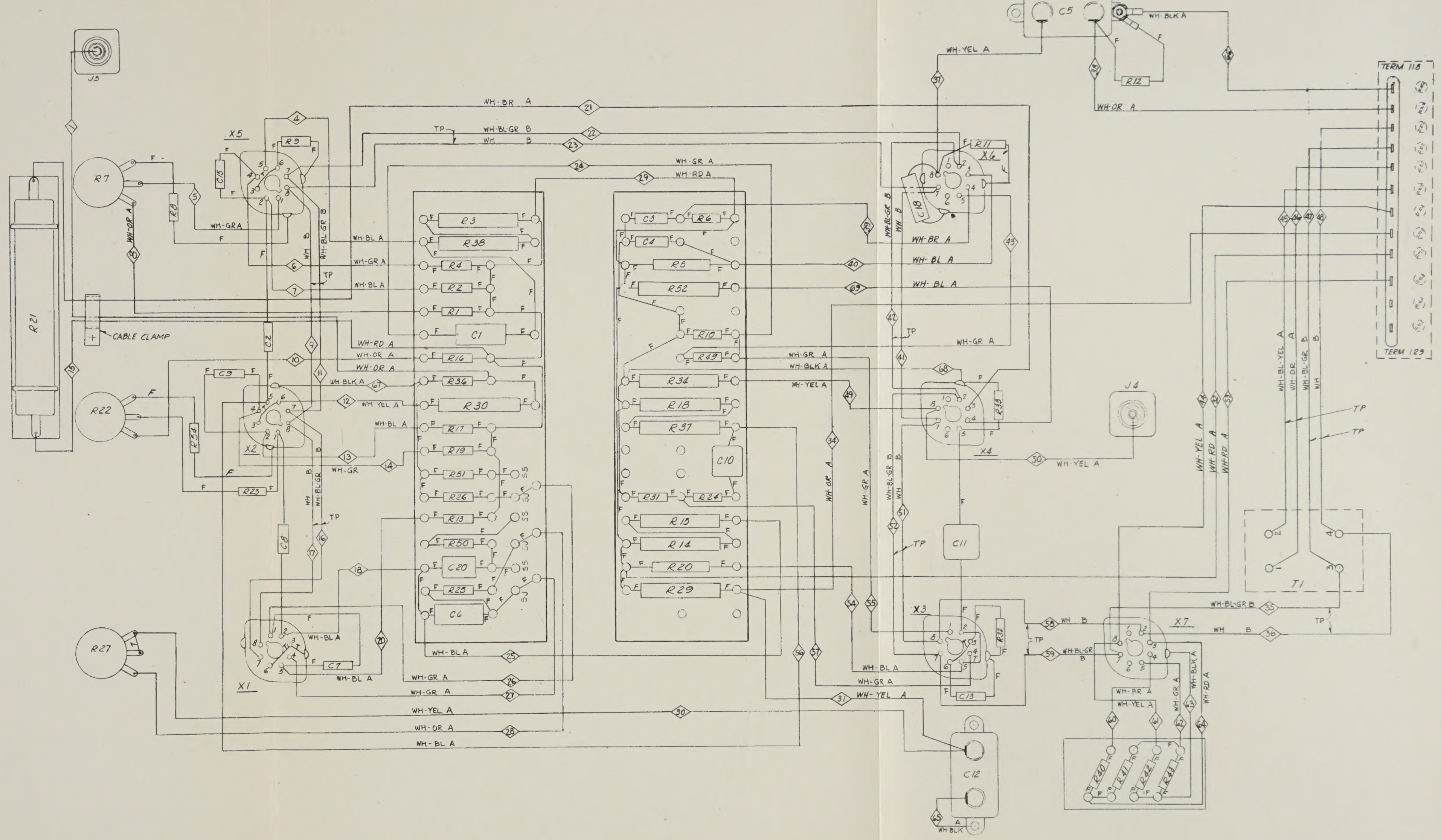

J3
R7
R21
R22
R27
X5
X2
X1
CABLE CLAMP
R9
C15
R8
C9
R54
R23
C2
C8
C7
R3
R38
R4
R2
R1
C1
R16
R36
R30
R17
R19
R51
R26
R13
R50
C20
R25
C6
C3
R6
C4
R5
R52
R10
R49
R34
R18
R37
C10
R31
R24
R15
R14
R20
R29
C5
R12
R11
X6
C18
X4
R33
C11
X3
R32
C13
C12
J4
X7
R40
R41
R42
R43
T1
TERM 118
TERM 123
TP
WH-BR A
WH-BL-GR B
WH B
WH-GR A
WH-RD A
WH-BL A
WH-OR A
WH-BLK A
WH-YEL A
WH-GR A

Figure 38—Modulation Generator—Wiring Diagram—BR-18395

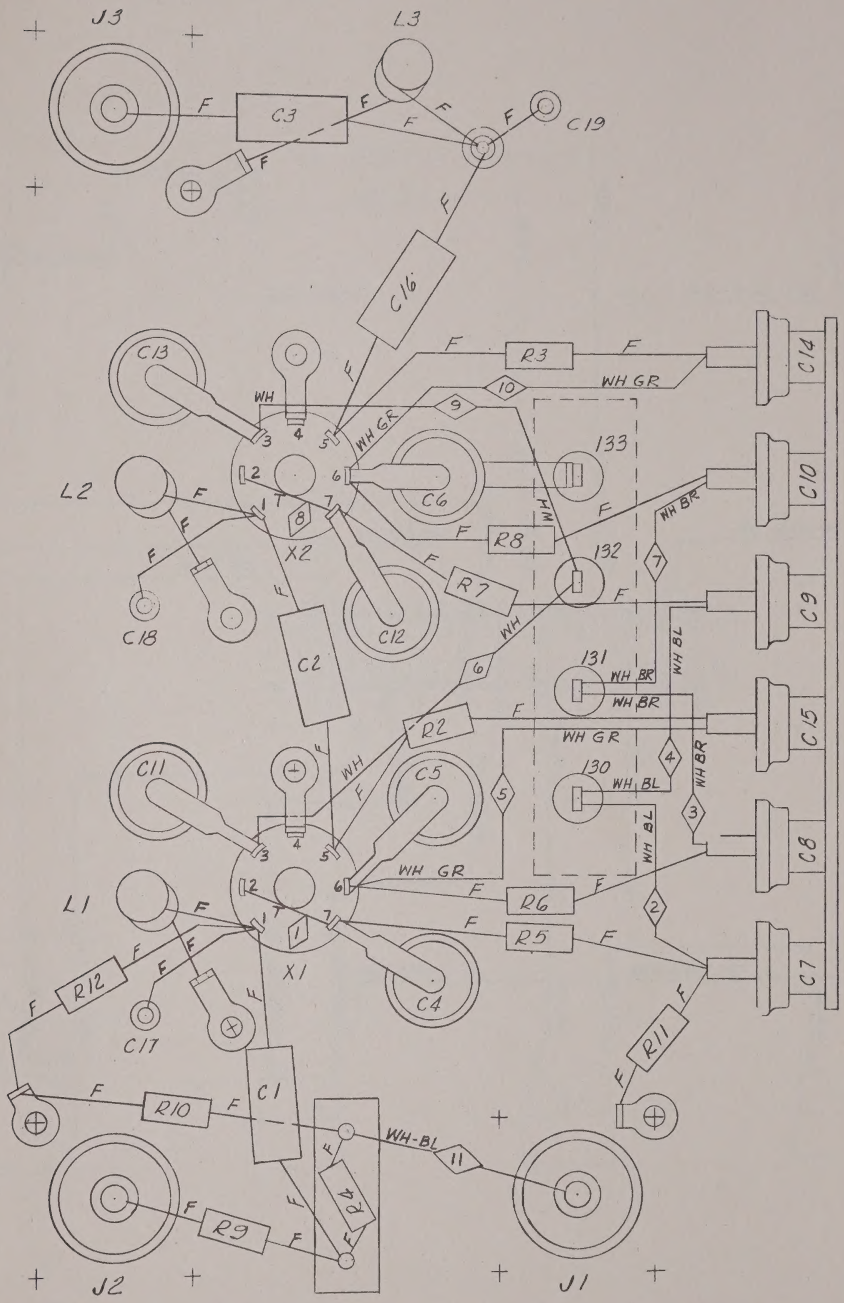

J3
L3
C3
F
C19
C16
C13
R3
C14
WH GR
10
9
WH
133
X2
C6
L2
R8
C10
WH BR
7
132
R7
C12
C18
C2
C9
WH BL
131
6
R2
C15
130
4
3
5
C11
C5
C8
2
L1
R6
R5
C7
X1
R12
C17
C4
R11
C1
R10
WH-BL
11
R4
R9
J2
J1

Figure 39—Amplifier—Wiring Diagram—BO–18397

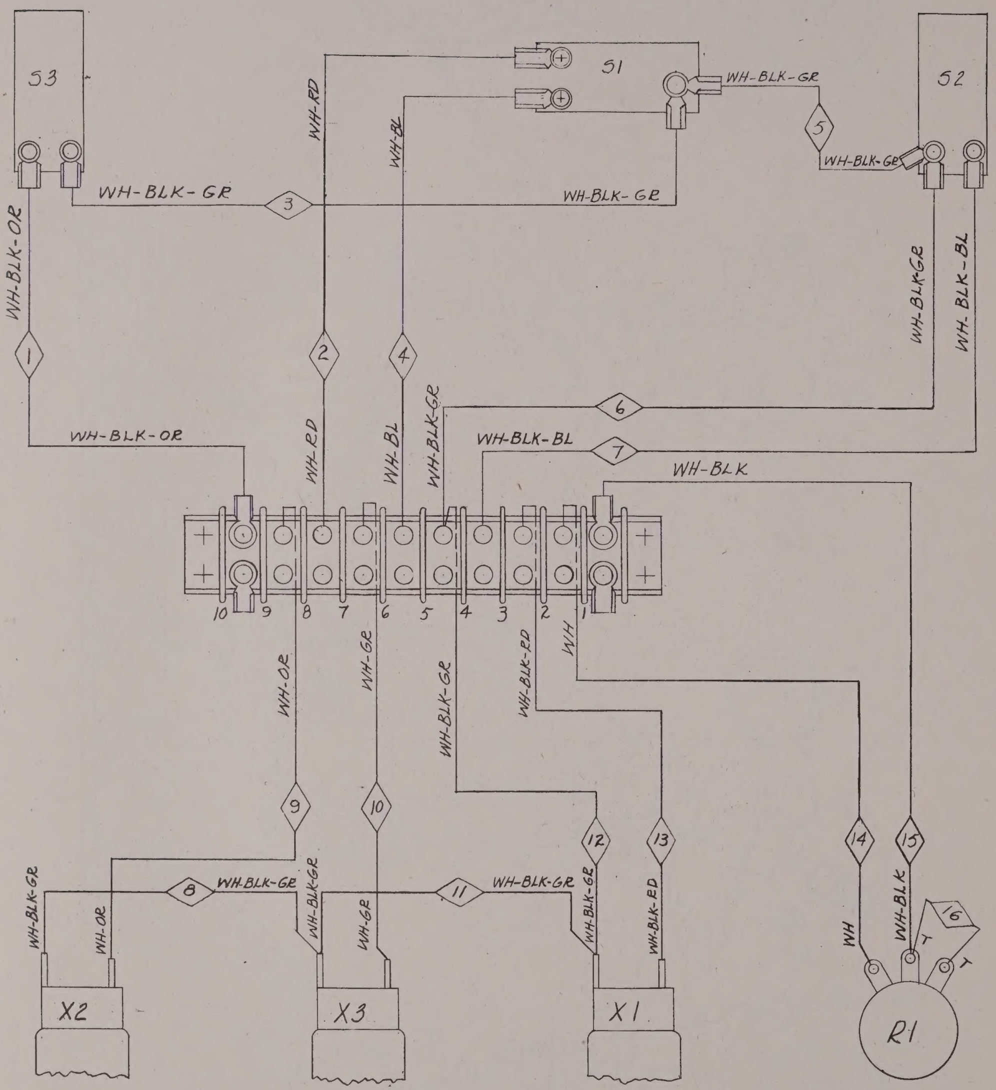

S3
S1
S2
WH-RD
WH-BL
WH-BLK-GR
5
WH-BLK-GR
WH-BLK-GR
3
WH-BLK-GR
WH-BLK-OR
1
2
4
WH-BLK-GR
WH-BLK-BL
6
7
WH-BLK-OR
WH-RD
WH-BL
WH-BLK-GR
WH-BLK-BL
WH-BLK
10
9
8
7
6
5
4
3
2
1
WH-OR
WH-GR
WH-BLK-GR
WH-BLK-RD
WH
9
10
12
13
14
15
WH-BLK-GR
WH-OR
8
WH-BLK-GR
WH-BLK-GR
WH-GR
11
WH-BLK-GR
WH-BLK-GR
WH-BLK-RD
WH
WH-BLK
16
T
T
X2
X3
X1
R1

Figure 40—Selector Control Unit—Wiring Diagram—BO–19923

Figure 41—Radar Transmitter-Receiver—Wiring Diagram—BXX–17959

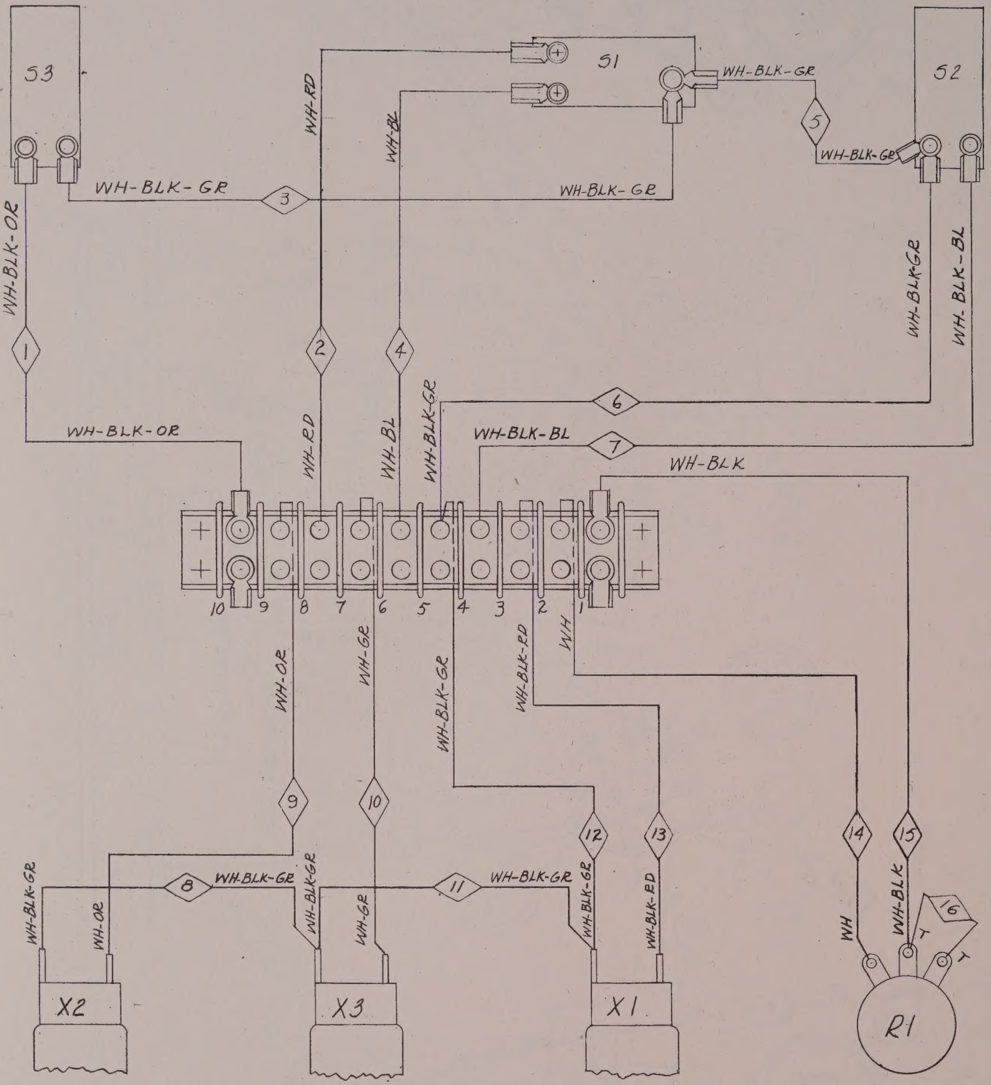

S3
S1
S2
WH-RD
WH-BL
WH-BLK-GR
5
WH-BLK-GR
WH-BLK-GR
3
WH-BLK-GR
WH-BLK-OR
WH-BLK-GR
WH-BLK-BL
1
2
4
6
7
WH-BLK-OR
WH-RD
WH-BL
WH-BLK-GR
WH-BLK-BL
WH-BLK
10
9
8
7
6
5
4
3
2
1
WH-OR
WH-GR
WH-BLK-GR
WH-BLK-RD
WH
9
10
12
13
14
15
WH-BLK-GR
WH-OR
8
WH-BLK-GR
WH-BLK-GR
WH-GR
11
WH-BLK-GR
WH-BLK-GR
WH-BLK-RD
WH
WH-BLK
T
16
T
X2
X3
X1
R1

Figure 40—Selector Control Unit—Wiring Diagram—BO–19923

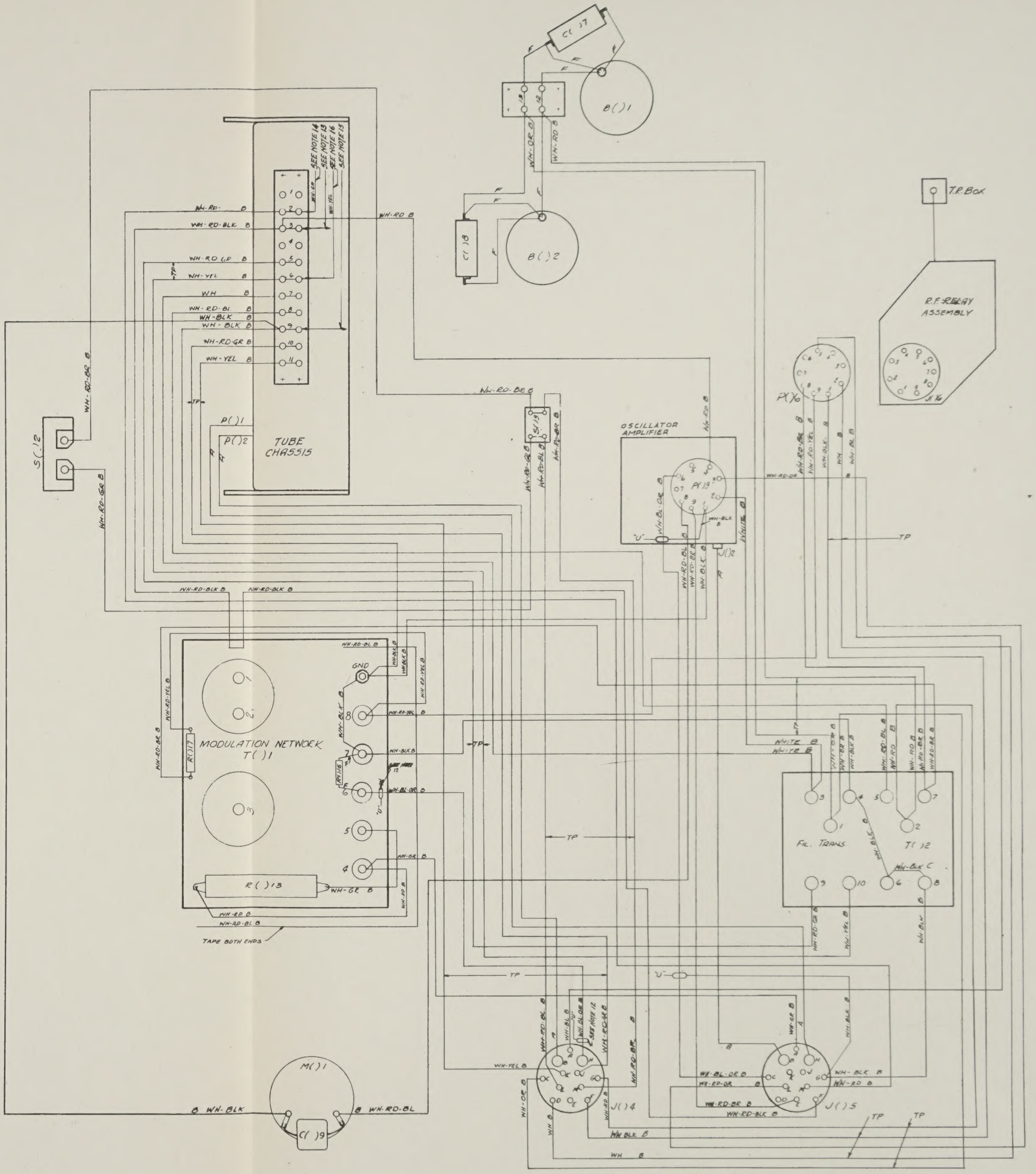
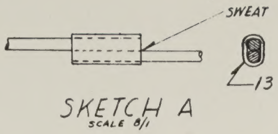

C( )7
B( )1
F
13
12
WH-OR B
WH-RD B
C( )8
B( )2
T.R. Box
R.F. RELAY ASSEMBLY
J( )16
P( )6
SEE NOTE 14
SEE NOTE 13
SEE NOTE 16
SEE NOTE 15
WH-GR
WH-YEL
WH-RD- B
WH-RD-BLK B
WH-RD GR B
WH-YEL B
WH B
WH-RD-BL B
WH-BLK B
WH-BLK B
WH-RD-GR B
WH-YEL B
WH-RD B
TP
P( )1
P( )2
TUBE CHASSIS
A
S( )12
WH-RD-BR B
WH-RD-GR B
WH-RD-BR B
S( )19
WH-RD-GR B
WH-RD-BL B
WH-RD-BR B
OSCILLATOR AMPLIFIER
P( )19
WH-RD B
WH-BL-OR B
WH-BLK B
WHITE B
"U"
J( )2
WH-RD-BL
WH-RD-BR B
WH-BLK B
WH-RD-OR
WH-RD-BR B
WH-RD-YEL B
WH-BLK B
WH B
WH-BL B
TP
WH-RD-BLK B
WH-RD-BLK B
WH-RD-BL B
WH-BLK B
WH-BLK B
WH-RD-YEL B
GND
MODULATION NETWORK T( )1
R( )17
R( )16
WH-RD-YEL B
WH-BLK B
SEE NOTE 12
WH-BL-OR B
WH-GR B
R( )13
WH-GR B
WH-RD B
WH-RD-BL B
TAPE BOTH ENDS
M( )1
C( )9
B WH-BLK
B WH-RD-BL
WHITE B
WHITE B
WH-OR B
WH-OR B
WH-BLK B
WH-RD-BL B
WH-RD B
WH-RD B
WH-RD-BR B
WH-RD-BR B
FIL. TRANS
T( )2
WH-BLK B
WH-BLK C
WH-RD-GR B
WH-YEL B
WH-BLW
WH-RD-BL B
WH-BL B
"U"
WH-BL-OR B
SEE NOTE 12
WH-RD-GR B
WH-RD-BR B
WH-YEL B
WH-OR B
WH B
WH-RD B
J( )4
WH BLK B
WH B
WH-GR B
WH-BLK B
WH-BL-OR B
WH-RD-OR B
WH-BLK B
WH-RD B
WH-RD-BR B
WH-RD-BLK B
J( )5
TP

Figure 41—Radar Transmitter-Receiver—Wiring Diagram—BXX–17959

Figure 44—Oscillator Amplifier—Wiring Diagram—BR-12521


SWEAT
13
SKETCH A
SCALE 8/1

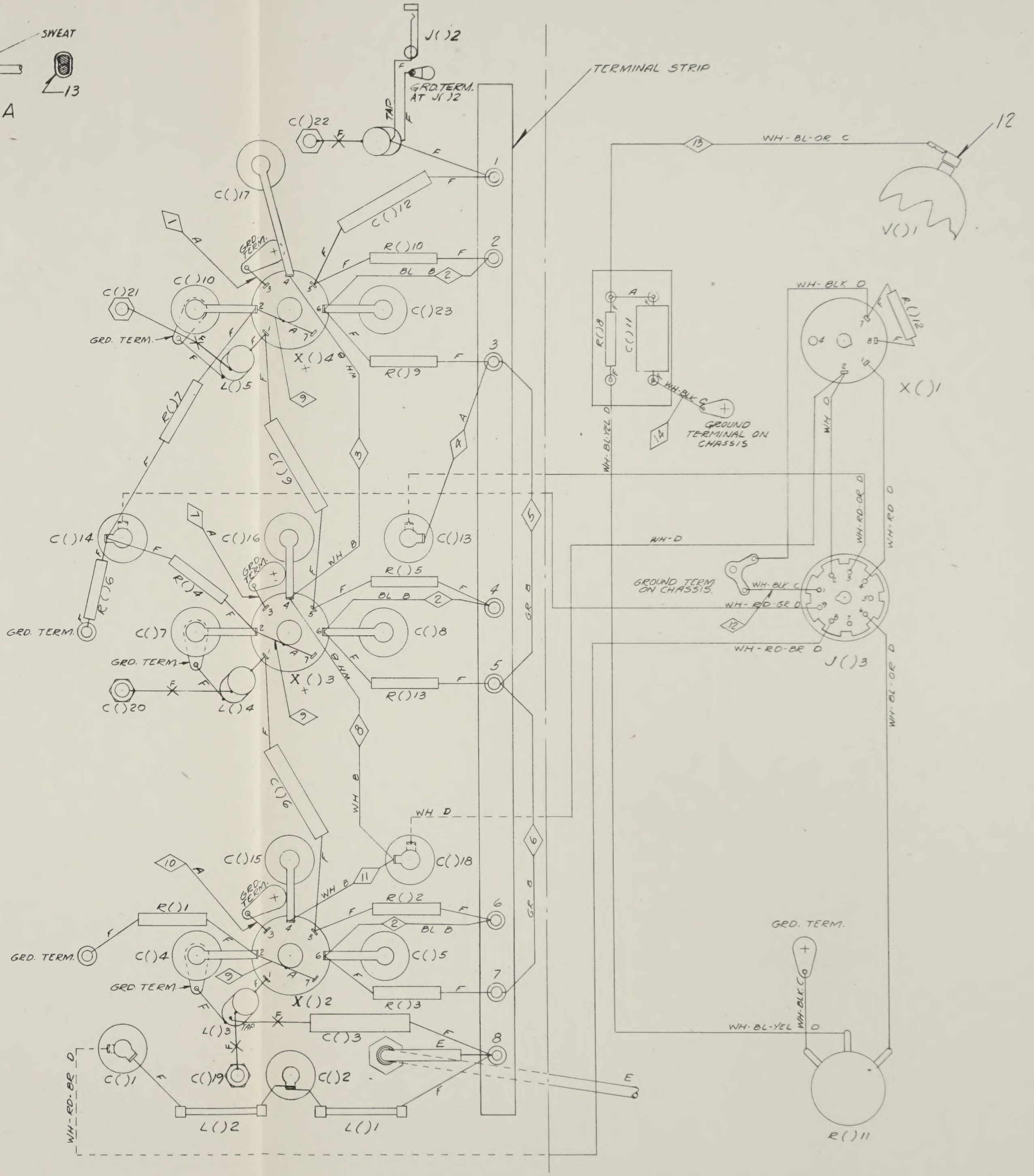

J( )2
GRD. TERM.
AT J( )2
TAP
C( )22
TERMINAL STRIP
12
WH-BL-OR C
13
V( )1
C( )17
C( )12
GRD. TERM.
R( )10
BL B
C( )21
C( )10
C( )23
GRD. TERM.
X( )4
R( )9
L( )5
R( )7
R( )8
C( )11
A
WH-BLK C
GROUND TERMINAL ON CHASSIS
14
WH-BL-YEL D
WH-BLK D
R( )12
X( )1
WH
WH-RD-OR D
WH-RD D
C( )9
C( )14
C( )16
C( )13
WH-D
GROUND TERM. ON CHASSIS
WH-BLK C
WH-RD-GR D
R( )6
R( )4
R( )5
BL B
C( )8
GR B
GRD. TERM.
C( )7
X( )3
R( )13
WH-RD-BR D
J( )3
WH-BL-OR D
C( )20
L( )4
C( )6
WH B
WH D
C( )15
C( )18
R( )1
R( )2
BL B
GRD. TERM.
C( )4
C( )5
GR D
X( )2
R( )3
L( )3
C( )3
C( )1
C( )19
C( )2
L( )2
L( )1
WH-RD-BR D
E
GRD. TERM.
WH-BLK C
WH-BL-YEL D
R( )11
1
2
3
4
5
6
7
8

Figure 44—Oscillator Amplifier—Wiring Diagram—BR-12521

Figure 42—Transmitter Tube Chassis—Wiring Diagram—BO–12531

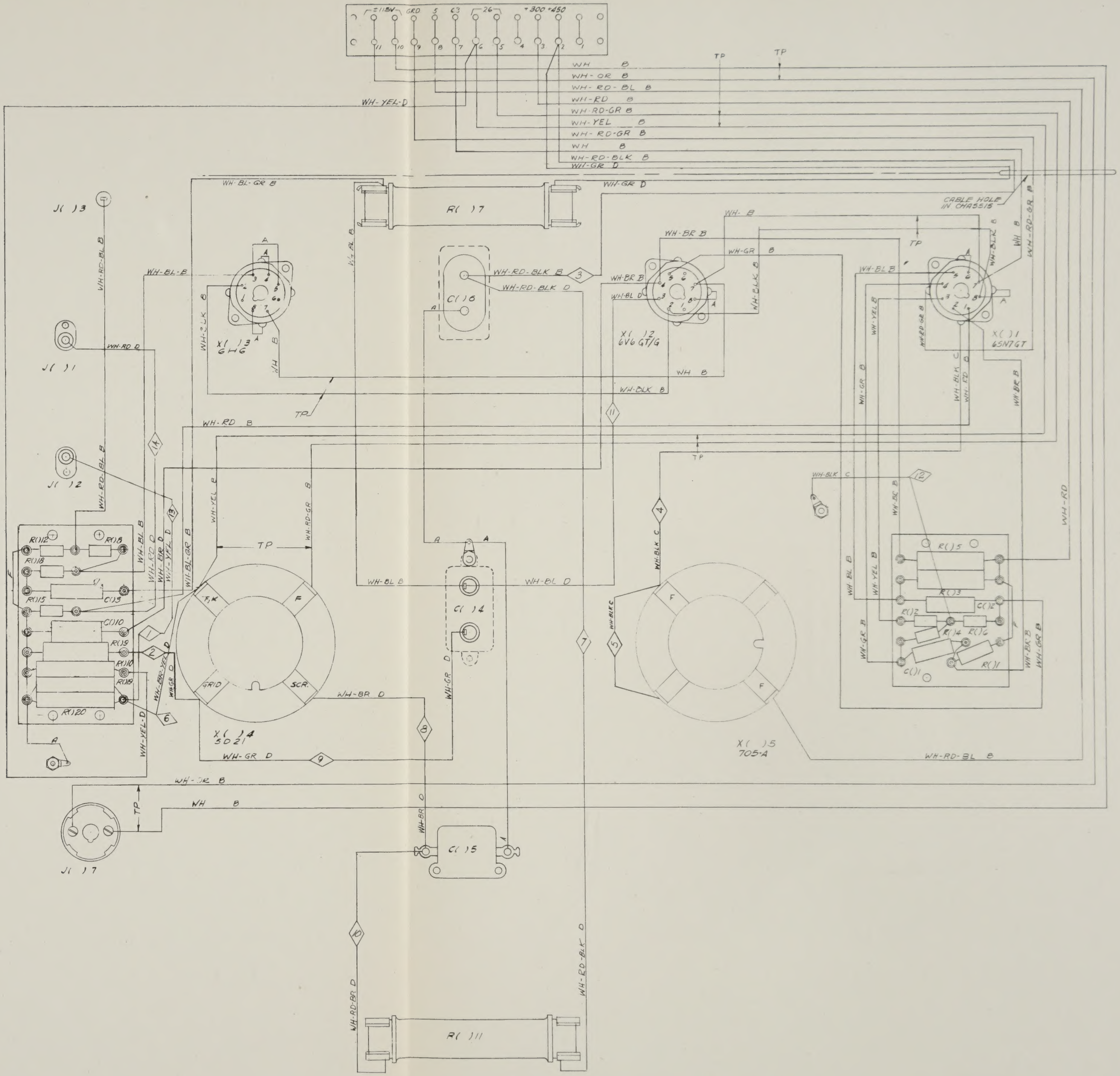

115V
GRD
26
+300 +450
WH B
WH-OR B
WH-RD-BL B
WH-RD B
WH-RD-GR B
WH-YEL B
WH-RD-GR B
WH B
WH-RD-BLK B
WH-GR D
WH-YEL-D
WH-BL-GR B
R( )7
WH-GR D
CABLE HOLE IN CHASSIS
J( )3
WH-RD-BL B
WH-BL-B
X( )3
6H6
C( )6
WH-RD-BLK B
WH-RD-BLK D
WH-BR B
WH-GR B
X( )2
6V6 GT/G
X( )1
6SN7GT
J( )1
WH-RD D
WH B
WH-BLK B
TP
WH-RD B
J( )2
WH-YEL D
WH-RD-GR B
WH-BLK C
R()12
R()13
R()18
R()15
C()3
C()10
R()9
R()10
R()8
R()20
WH-BL D
WH-BL B
C( )4
F,K
F
GRID
SCR.
WH-BR D
X( )4
5D21
WH-GR D
WH-YEL-D
X( )5
705-A
WH-RD-BL B
R( )5
R( )3
C()2
R()2
R()4
R()6
C()1
R()1
WH-RD
WH-OR B
WH B
J( )7
C( )5
WH-BR
R( )11
WH-RD-BR D
WH-RD-BLK D

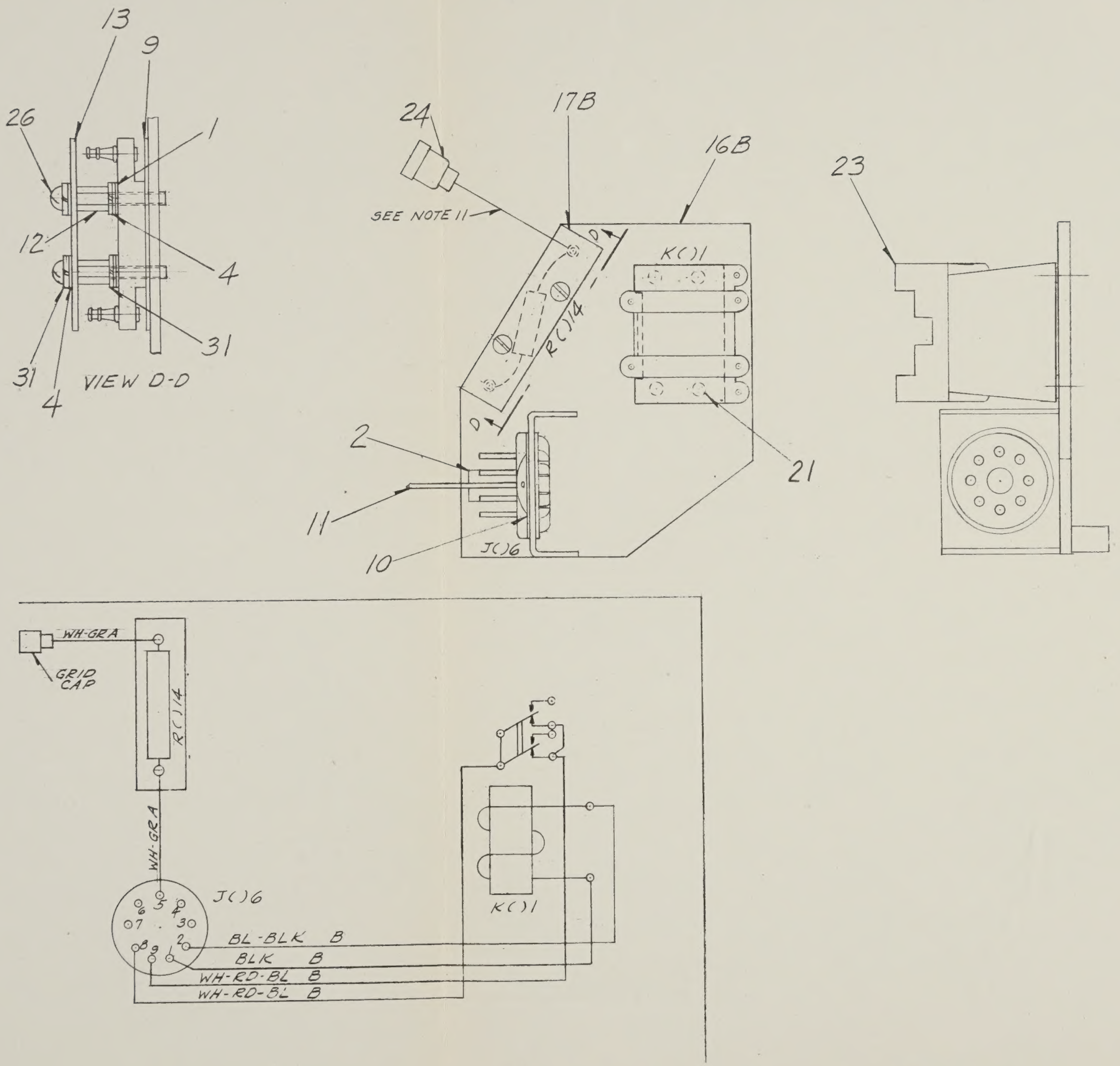
Figure 42—Transmitter Tube Chassis—Wiring Diagram—BO–12531

REQ	PIECE	ITEM		NAME	
AS REQ.		41	WH-RD-BL-BL-BK-&-BLK	STRANDED ROCKBESTOS ACA HI HOOKUP WIRE(#20GA) OR STRANDED AERO-GLAS WIRE OBTAIN FROM LENZ ELECTRIC MFG. CO. CHICAGO, ILL. (#20GA)	
AS REQ.		37	WH-GR	#20 A.W.G. STRANDED, SINGLE COND. WIRE WITH .050 WALL OF "VINYLITE." OBTAIN FROM WHITNEY BLAKE CO-NEW HAVEN, CONN.	
		~~34~~			ZINC PLT. 563A FIN. (.0002THK) & CHROMATE 516A FIN.
		~~33~~			
4		31		#6 (.138) X 1/16 X 3/64 NON TANGLING LOCK WASHER STL.	
		~~30~~			
		~~29~~			
		~~28~~			
		~~27~~			
2		26		.138-32 X 5/16 R.H.S.M.SCR	
1	BA-10123-3	24		GRID CAP	
1	K()1	23		KS-5910-L16 RELAY WITH ELASTIC STOP NUTS.	
		~~22~~			
4		21		.138-32 X 7/16 R.H.S.M.SCR. ZINC PLT 563A FIN. (.0002 THK.) & CHROMATE 516A FIN.	
		20			
		~~18~~			
1	BO-14414-5 R()14	17B		MOUNTING STRIP ASSEM.	
1	BO-12545-1	16B		PLATE ASSEM.	
		~~15B~~			
		~~14B~~			
1	BA-53448	13		STRIP	
2	BA-53447	12		STUD	
1	BO-18144-2	11		WIRE	
1	BO-18144-1	10		WASHER	
1	BO-17603-3	9		STRIP	
		~~8~~			
		~~7~~			
		~~6~~			
		~~5~~			
4	BA-10063-42	4		WASHER	
		~~3~~			
1	BA-10116-10 J()6	2		PLUG	
2	BA-10013-18	1		WASHER	

STOCKLIST

BO-14413

Figure 43—RF Line Relay—Assembly and Wiring Diagram—BO–14413


13
9
26
1
12
4
31
31
4
VIEW D-D
24
SEE NOTE 11
17B
16B
D
K()1
R()14
D
2
11
10
J()6
21
23
WH-GRA
GRID CAP
R()14
WH-GRA
J()6
6 5 4
7 3
2
8 9 1
BL-BLK B
BLK B
WH-RD-BL B
WH-RD-BL B
K()1

REQ	PIECE	ITEM		NAME	
AS REQ.		41	WH-RD-BL & BL-BK & BLK	STRANDED ROCKBESTOS ACA HI HOOKUP WIRE(#20GA) OR STRANDED AERO-GLAS WIRE OBTAIN FROM LENZ ELECTRIC MFG. CO. CHICAGO, ILL. (#20GA)	
AS REQ.		37	WH-GR	#20 A.W.G. STRANDED, SINGLE COND. WIRE WITH .050 WALL OF "VINYLITE." OBTAIN FROM WHITNEY BLAKE CO-NEW HAVEN, CONN.	
		~~34~~			ZINC PLT. 563A FIN. (.0002THK) & CHROMATE 516A FIN.
		~~33~~			
4		31		#6(.138) X 1/16 X 3/64 NON TANGLING LOCK WASHER STL	
		~~30~~			
		~~29~~			
		~~28~~			
		~~27~~			
2		26		.138-32 X 5/16 R.H.S.M.SCR	
1	BA-10123-3	24		GRID CAP	
1	K()1	23		KS-5910-L16 RELAY WITH ELASTIC STOP NUTS	
		~~22~~			
4		21		.138-32 X 7/16 R.H.S.M.SCR. ZINC PLT 563A FIN. (.0002THK) & CHROMATE 516A FIN.	
		20			
		~~18~~			
1	BO-14414-5 R()14	17B		MOUNTING STRIP ASSEM.	
1	BO-12545-1	16B		PLATE ASSEM.	
		~~15B~~			
		~~14B~~			
1	BA-53448	13		STRIP	
2	BA-53447	12		STUD	
1	BO-18144-2	11		WIRE	
1	BO-18144-1	10		WASHER	
1	BO-17603-3	9		STRIP	
		~~8~~			
		~~7~~			
		~~6~~			
		~~5~~			
4	BA-10063-42	4		WASHER	
		~~3~~			
1	BA-10116-10 J()6	2		PLUG	
2	BA-10013-18	1		WASHER	

STOCKLIST

BO-14413

Figure 43—RF Line Relay—Assembly and Wiring Diagram—BO-14413

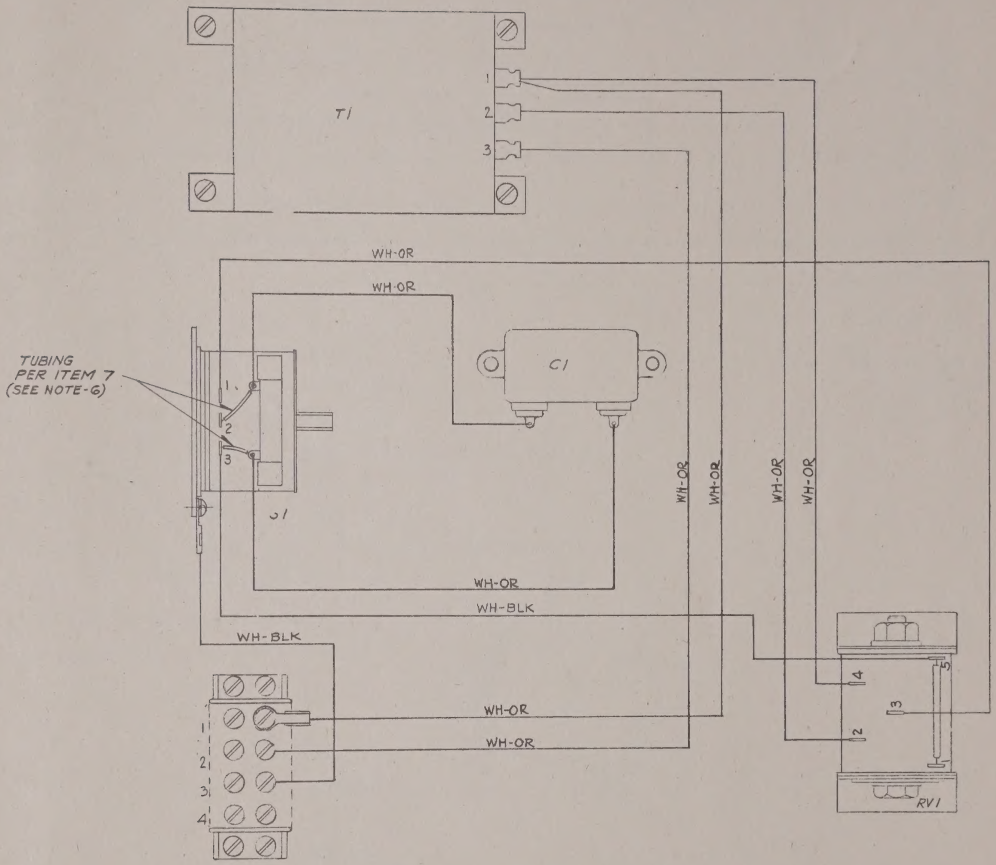

T1
1
2
3
WH-OR
WH-OR
C1
TUBING
PER ITEM 7
(SEE NOTE-6)
1
2
3
S1
WH-OR
WH-OR
WH-OR
WH-OR
WH-OR
WH-BLK
WH-BLK
WH-OR
WH-OR
1
2
3
4
4
5
3
2
1
RV1

Figure 45—Wave Guide Pick-Up—Wiring Diagram—BO-19556

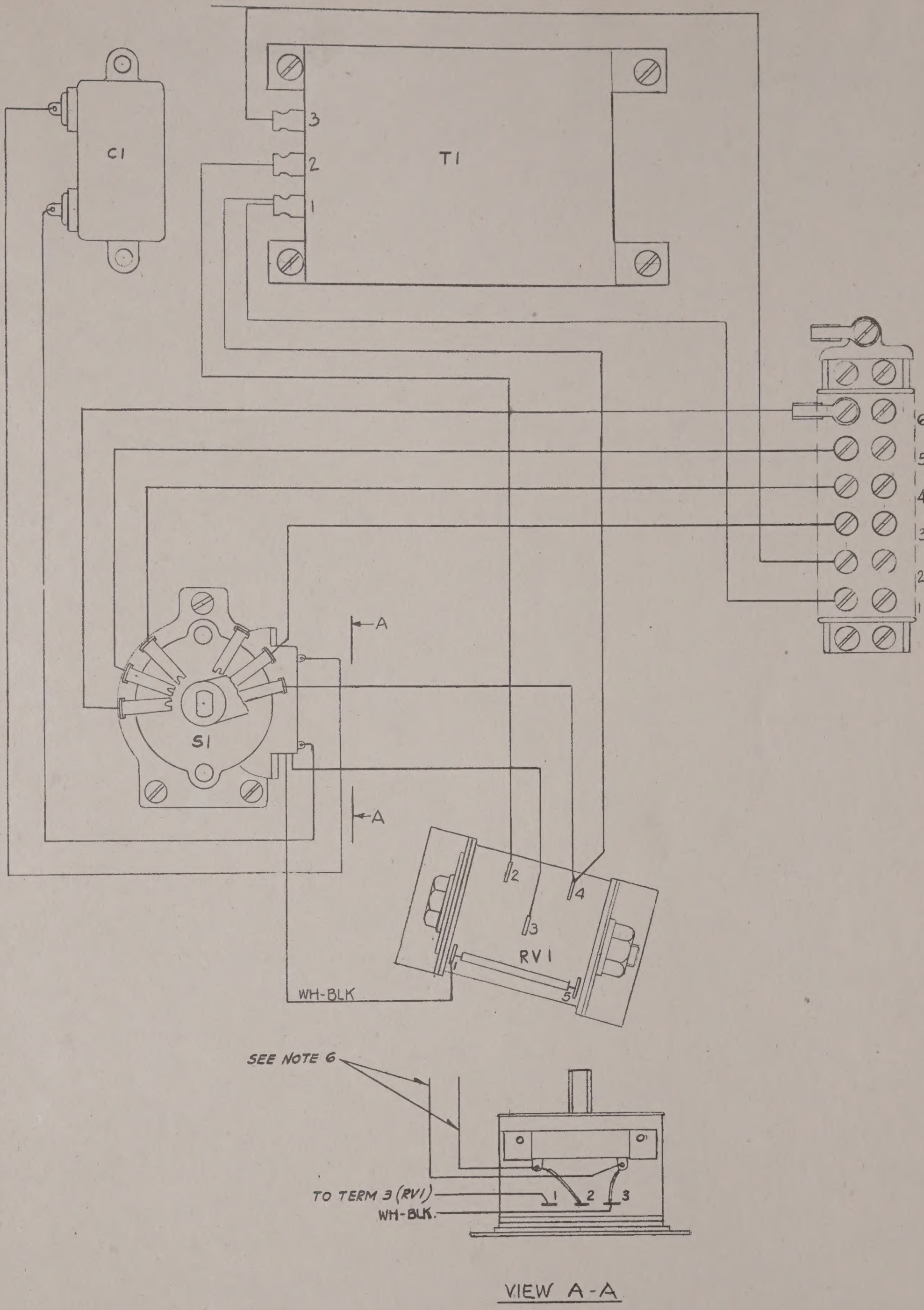

C1
T1
3
2
1
6
5
4
3
2
1
A
A
S1
2
4
3
RV1
5
WH-BLK
SEE NOTE 6
TO TERM 3 (RVI)
WH-BLK.
1
2
3
VIEW A-A

Figure 46—Wave Guide Switching Unit—Wiring Diagram—BO-19551